January 3, 1949

STEEL

The Magazine of Metalworking and Metalproducing

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Illinois U Library

Hot Strip Mills

Designed and Built by MESTA

. . . . The pages that are missing were removed because they were advertisements.

COLOR PHOTO BY E. D. MESTA

Mesta 68" Four-High
Continuous Hot Strip Mill, Universal Stand

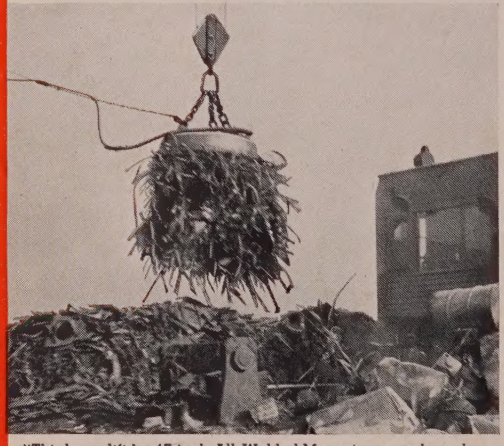
U OF I LIBRARY

DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

MESTA MACHINE COMPANY · PITTSBURGH, PA.

MAGNETS & CRANE CONTROL

Overhead Crane, equipped with EC&M Crane Control and 65-inch diameter All-Welded Magnet, serves all parts of eastern scrap yard.



"This large lift by 45-inch All-Welded Magnet was made under normal conditions," reports our Philadelphia Office.

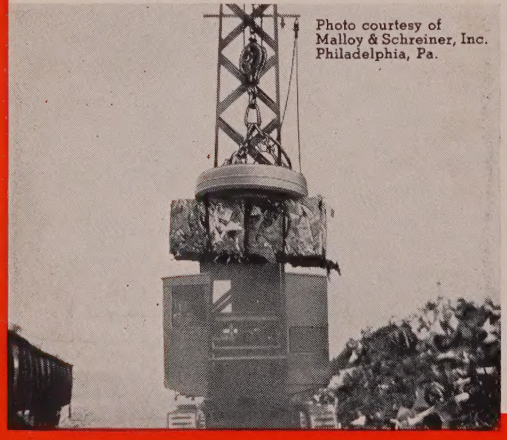


Photo courtesy of Malloy & Schreiner, Inc. Philadelphia, Pa.

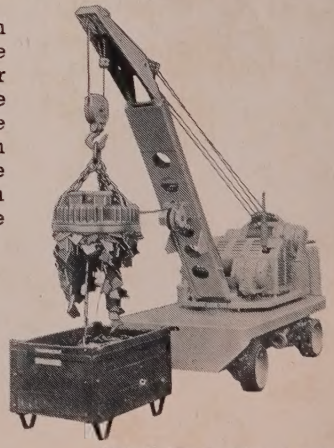
Four bales weighing from 450 to 600 pounds each taken from baler to R. R. cars by this 45-inch magnet.

EC&M builds the Type SW *All-Welded* Lifting Magnet in sizes from 39-inch diameter up for boom and overhead cranes. For cranes of limited capacity, such as small truck-cranes, EC&M builds the Type R circular magnets in sizes of 29-inch diameter and smaller. EC&M also builds a complete line of crane control, both a-c (Bulletin 930) and d-c, (Bulletin 921) for the overhead crane. When buying overhead electric cranes and magnets, specify EC&M for full coverage.

For heavy duty continuous scrap-handling, the EC&M Type SW *All-Welded* Lifting Magnet has *no equal*. The *All-Welded* design gives tight construction—the SW coil-winding is *doubly-sealed* against moisture—pole shoes can *not* loosen and form air gaps. Only EC&M's Type SW Magnet has *both* pole shoes welded.

For specific information on magnets, advise *type* and *capacity* of crane; for control information, give *horsepower* and *voltage* of motors for *each* motion on the crane, so that we can write you fully when sending the descriptive bulletins.

EC&M Circular Magnets come in eleven sizes for all handling needs. Ask for Bulletins 900 and 904.



29-inch diameter Magnet on truck crane receives 36-volt power directly from truck.

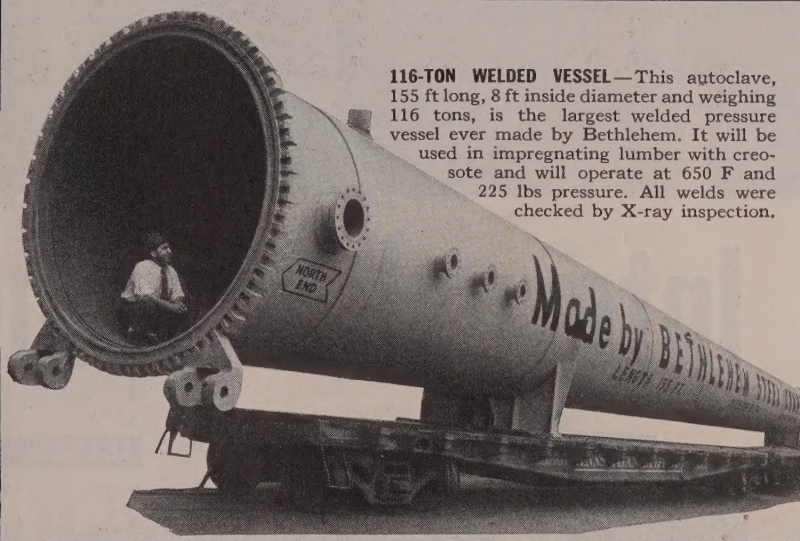
THE ELECTRIC CONTROLLER & MFG. CO.

2711 EAST 79TH STREET • CLEVELAND 4, OHIO

Some Bethlehem Highlights of '48

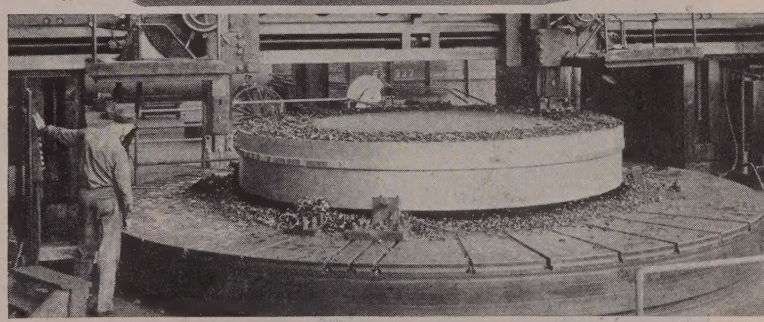
PLOYEE WELFARE—The year saw marked vances in working conditions and improved ilities for the welfare of Bethlehem employees. ove is the new welfare room at the Williams- t Division, with individually air-conditioned kers at the upper left and germ-killing ultra- let lights on walls at the right.

SAFETY ACCOMPLISHMENTS—First, second, third and fourth places in the 1947-1948 Safety Contest among major steel plants of the country, sponsored by the National Safety Council, were awarded to plants of Bethlehem Steel Company. This is the first time in the history of the contests that the first four places have been won by units of a single company. In addition, other awards were made to Bethlehem operations during the year for outstanding safety accomplishments.

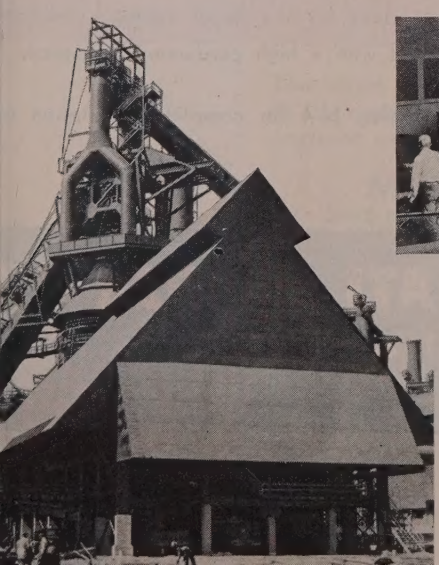


116-TON WELDED VESSEL—This autoclave, 155 ft long, 8 ft inside diameter and weighing 116 tons, is the largest welded pressure vessel ever made by Bethlehem. It will be used in impregnating lumber with creosote and will operate at 650 F and 225 lbs pressure. All welds were checked by X-ray inspection.

LOY STEEL FILM—A new motion picture describing e production of alloy steels in Bethlehem plants now nearing completion and is expected to be ready r release during the early part of the new year.



CYCLOTRON MAGNET—Machining a pole piece for The University of Chicago giant cyclotron, designed to produce 400,000,000 electron volts. The magnet for this new atom smasher is built up of 28 rectangular members forming the yoke and six circular pole pieces, and weighs a total of 4,140,000 lbs. This is the second magnet of this size built by Bethlehem.

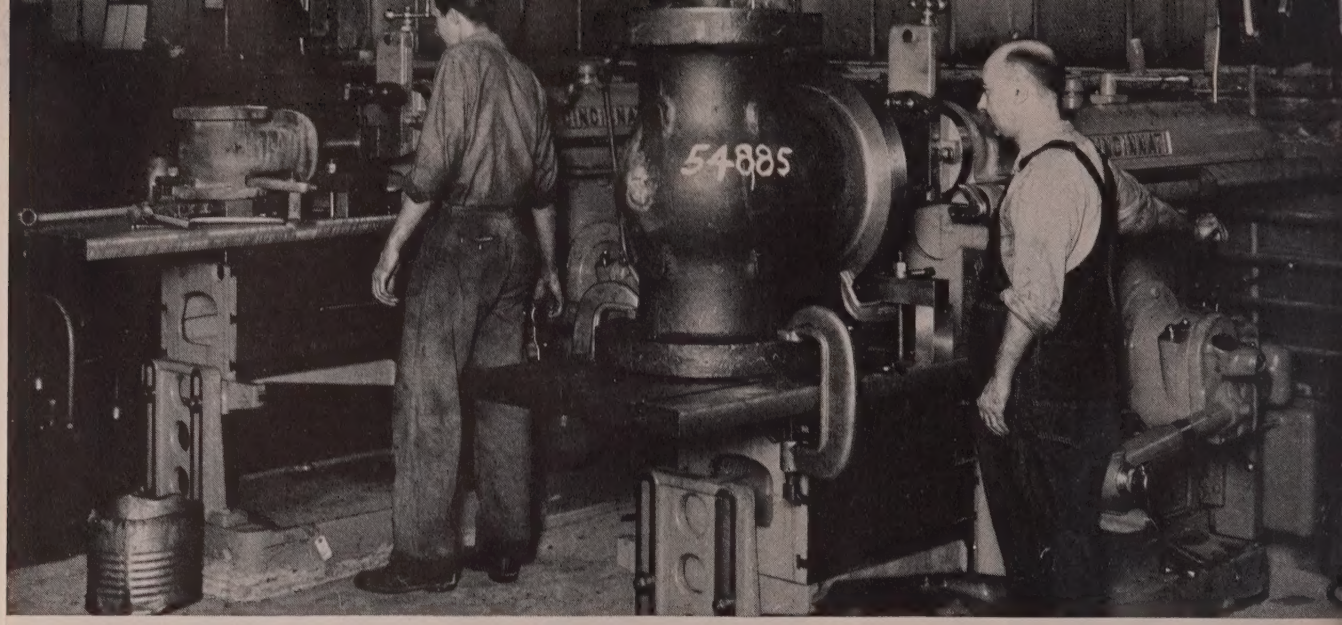


NEW BAR AND ROD MILL ON COAST—A new high-speed bar and rod mill was put into operation during 1948 at Bethlehem Pacific's Los Angeles Plant. The fastest of its type on the Pacific Coast, this mill produces a variety of flats, merchant sections, bars and rods for Western industries.

NEW BLAST FURNACE—This blast furnace at Sparrows Point Plant, put into service during the summer, is part of Bethlehem's postwar expansion program involving the expenditure of approximately $300,000,000 and increasing Bethlehem's annual ingot capacity by 900,000 net tons.

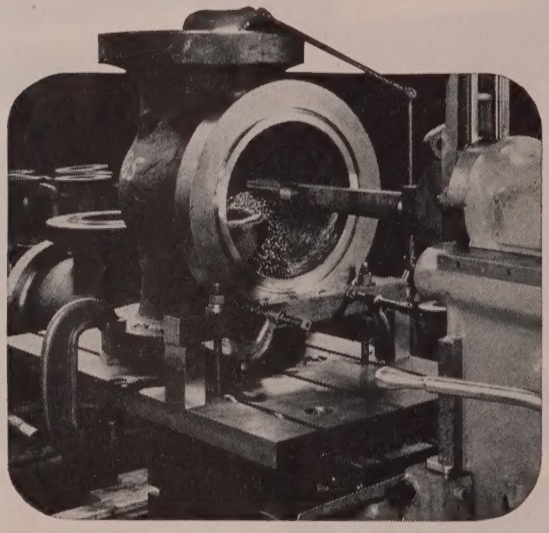
BETHLEHEM STEEL

42642



Photos—Courtesy William Powell Valve Co., Cincinnati, Ohio

Internal Shaping...



Here is a 32" Cincinnati shaping the guides on a 10" class 600-lb. flanged end gate valve body. Cut length is 16"; feed, .010".

SOLVED THE PROBLEM Internal shaping is the answer to a long list of "hard-to-get-at jobs." The illustration shows two Cincinnati Shapers of a battery of ten machines shaping both male and female valve guides at the Powell Valve Company.

MANY SIZES Valves ranging from small 8"—150 lbs. pressure to 30"—2500 lbs. pressure, weighing well over 1000 lbs., are rapidly and efficiently handled.

SIMPLE TOOLING Extension tool holder and high-speed bits cost relatively little. Cincinnati supplementary tables permit rapid setups for the larger valves. Low-cost operation is combined with a high production efficiency.

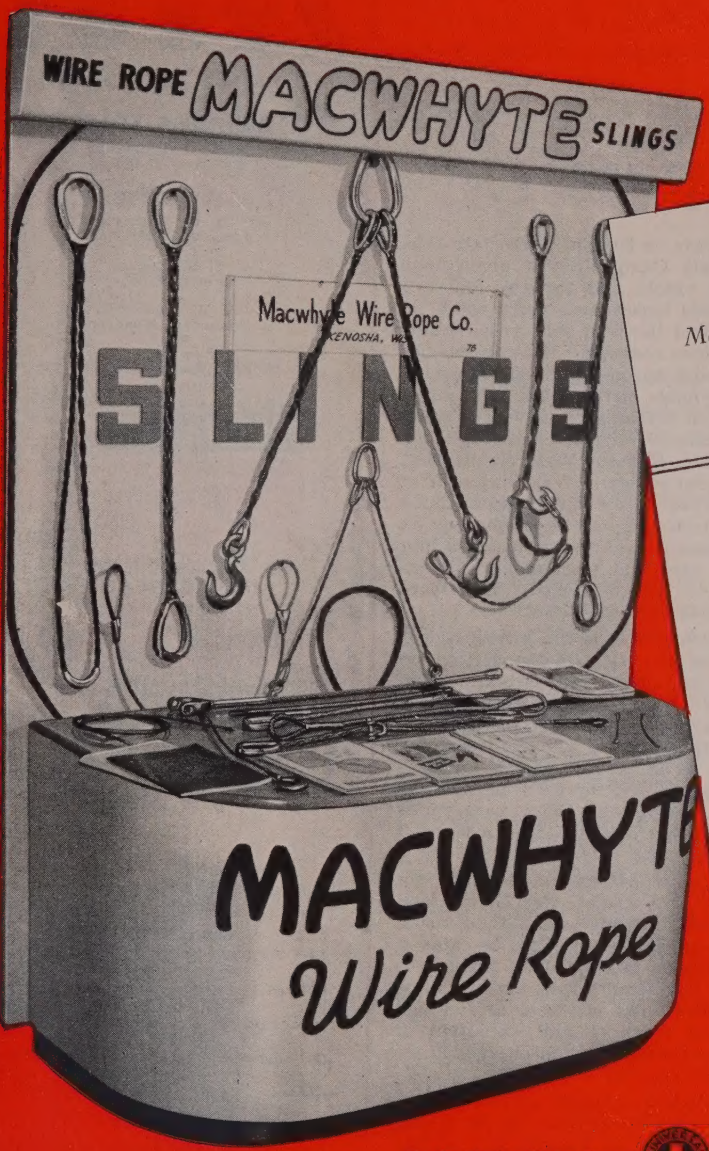
Write for Shaper Catalog N-4 for complete description of Cincinnati Shapers.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

SCANNED



From
SAFETY DIRECTOR

Memo to:
General Superintendent
Plant Engineer
Purchasing Agent

I saw this display of Macwhyte Braided Wire Rope Slings. They are being used by hundreds of companies for handling all types of loads with safety, ease, and economy. I think we could use these slings to good advantage in our plant. Let's ask Macwhyte to have one of their Sling Engineers consult with us regarding our load handling problems.

Member National Safety Council

Macwhyte Slings are made to meet your requirements in any capacity, length, and design. Ask for a Macwhyte engineer to help select the proper slings for your use.

MACWHYTE COMPANY

2912 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cable and Assemblies, Stainless Steel and Monel Metal Wire Ropes. Catalog on request.

Macwhyte distributors throughout the U.S.A. and other countries. Mill Depots in the following cities: New York, Pittsburgh, Chicago, Minneapolis, Fort Worth, Portland, Seattle, San Francisco, Los Angeles.

There's a Macwhyte Sling that's the right sling for any load.

NO. 953-S

Behind the Scenes...

YEARBOOK OF INDUSTRY—1949

Starting out our sixty-sixth year of publication with a resounding report, we proudly present our Yearbook of Industry Issue.

Even the monumental size of this issue, big as it is, doesn't reflect the amount of miles and of midnight oil which the editors threw into the pot in order to come up with the volume of important facts and figures you'll find in its pages. Just as an example, take a look at the more than thirty pages of charts and tables which comprise the statistical section. If you're interested in capacity, production, distribution or prices of steel and nonferrous metals, you'll find all the latest there. Data on wages and employment take their share of the space. Distribution figures on finished steel for the entire year of 1948—and don't ask us how the editors managed to get those figures, even before the year was over—are available in quantity. Production figures on stainless and alloy steels for the past 20 years are in an appropriate niche. We could go on and fill the whole column with a list of what's there in a form which you'll be able to use for a dozen different purposes. They haven't limited the figures to production of metals alone, either. Pumps and compressors, for example, are represented in the figures on fields where metals are consumed. Want to know how many homes were built last year? You can find that, too, in among the other numbers. Hope you find exactly what you're looking for—if not, drop the editors a line and tell them what they've omitted!

Some of the lead articles are excellent, while the rest are outstanding. While we're talking about it, might as well pull out all the stops and really let fire with a galaxy of adjectives. Take for example Ben Price's article on business prospects. You probably won't find anywhere a more realistic summary of the current situation nor a better analysis of the outlook for 1949. And what about wages and labor's attitude? Will the basing point system return, or will f.o.b. mill prices continue to be the rule throughout 1949? STEEL has the answers, and you'll find them in this book!

The section on foreign industry was a tough assignment, particularly the article on Russia. Associate Editor Walt Campbell was given that nut to crack, and to hear him tell about his experiences you'd think he sat behind the wall during the Mundt committee sessions. His gumshoeing involved a baroness, several Russians of less noble birth, and a good many offices in Washington as well as some international operations through our European offices. Walt claims that in several places in Washington after he learned all he could and outlined what he was trying to do, the guy on the other side of the desk asked him to be sure and pass along the answers to his questions if they were answered anywhere else!

As usual, one of the principal features of the book is the section on technical progress. This textbook on what's new, in capsule form, is getting more popular every year, and we know those of you who are interested in the technical side of this industry of ours will find there's a lot of interesting reading in those paragraphs by dozens of acknowledged leaders of metalworking.

The art work was under the direction of Don Cadot, Art Editor, and his staff. They've done their usual excellent job. Gets to be almost monotonous talking about the superlative functional layout job that crew of artists turns out, week after week, but the planning and execution of this particular issue is one which we couldn't pass by.

If we had a couple of extra pages for this week's column, we could easily fill them by commenting on the rest of the things you'll find in the issue. This has to be crammed into the usual space, however, so instead we have one suggestion to make. At the bottom of the page you'll see, as usual, the page number of the contents page. Down the left-hand side of that page there are some 40 names, starting out with E. L. Shaner. Every one of those people played an important part in putting this book together, as they will the remaining 51 issues of 1949. They've done a wonderful job!

Shrdlu

(Editorial Index—page 113)

STEEL

Vol. 124—No. 1 January 3, 1949

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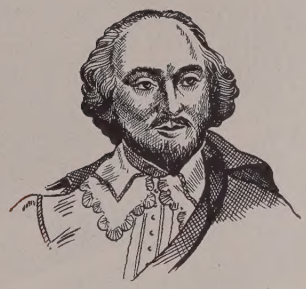
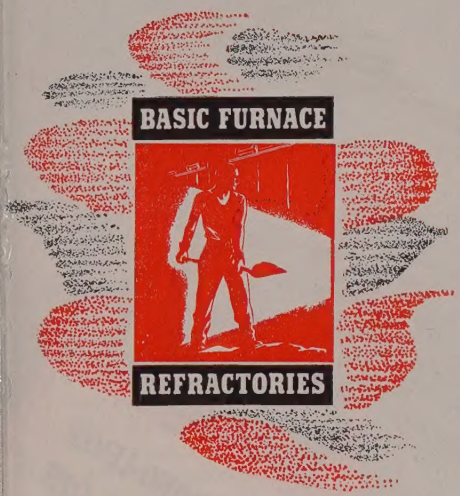
Editorial Staff on Contents Page

What's in a name?





WHAT do the trade names Magnefer, Syndolag, Basifrit, Ramset, Gunmix and Gunchrome mean to you?

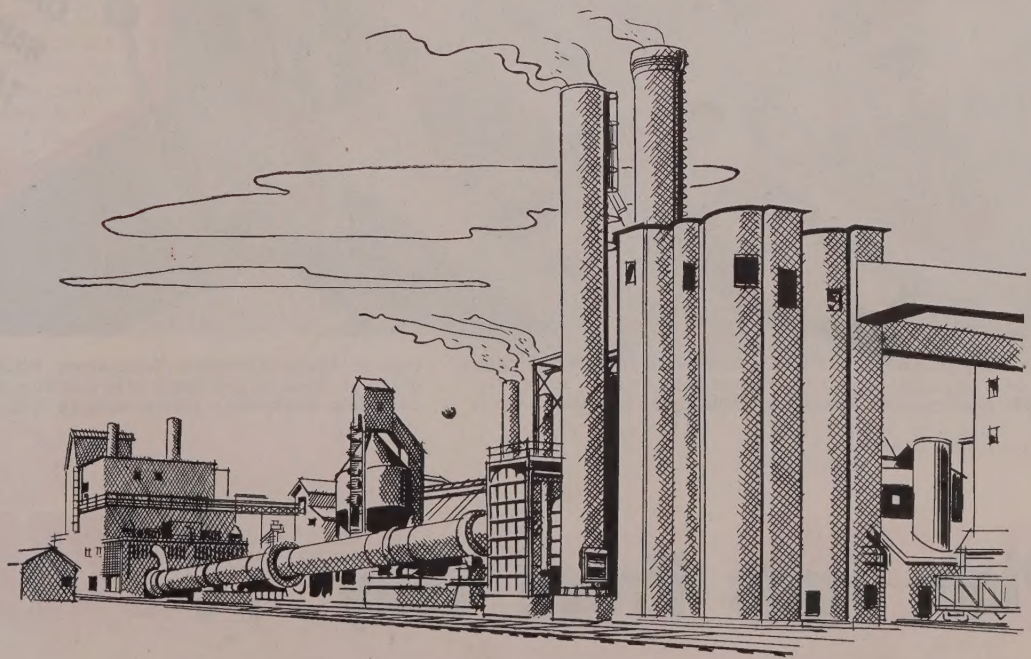
They are names familiar to every open hearth and electric furnace man—names that stand for dependable refractory products—backed by the resources and experience of Basic Refractories, Inc. in over 30 years of refractory production—

—a staff of more than 40 technicians—men and women who are engaged in daily research, development and production control.

—a record of leadership as evidenced by the introduction of magnesia ramming mixes, basic and neutral gun refractories and such refinements in dead burned dolomite as tar sealing, the container car and controlled sizing.

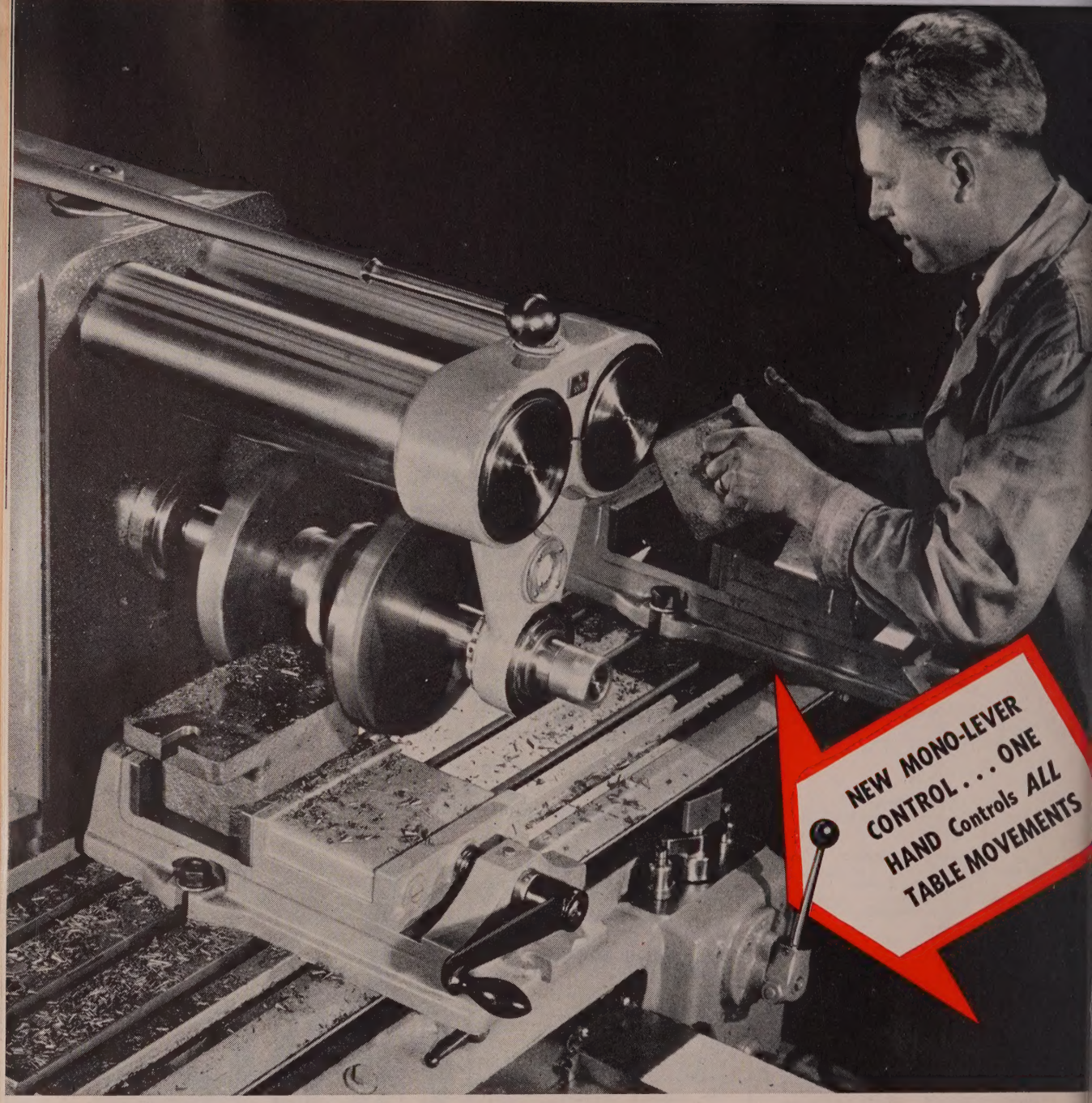
—a modern plant, representing an investment of more than $4,000,000, devoted exclusively to the manufacture of basic and neutral refractories and the processing of raw dolomite for refractory, commercial, fluxing and agricultural liming uses.

—finally, a field force of refractories specialists who are at your service, for consultation and help on refractory problems — to see that you get the utmost from Basic Refractories products.



Basic Refractories Incorporated 845 HANNA BUILDING, CLEVELAND 15, OHIO

xclusive Agents in Canada: REFRACTORIES ENGINEERING AND SUPPLIES, LTD., Hamilton and Montreal

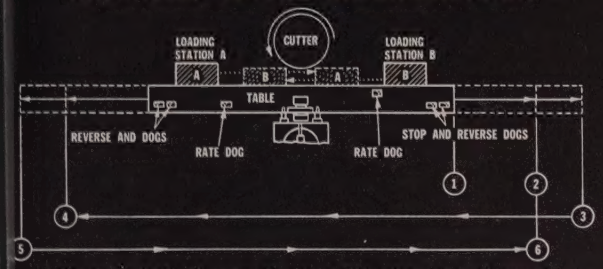


Talk about production! Here's picture-proof of reciprocal milling on a standard knee-type Kearney & Trecker 30 hp No. 3 CSM machine with Automatic Table Cycle and *Mono-Lever* control. Using Automatic Table Cycle, machine turns out hundreds of these forged parts with operator merely loading and unloading workpieces. Actual savings 31%.

Plain Facts Prove Why . . . THESE TIME UP TO 31% - PAY

HOW JOB IS DONE

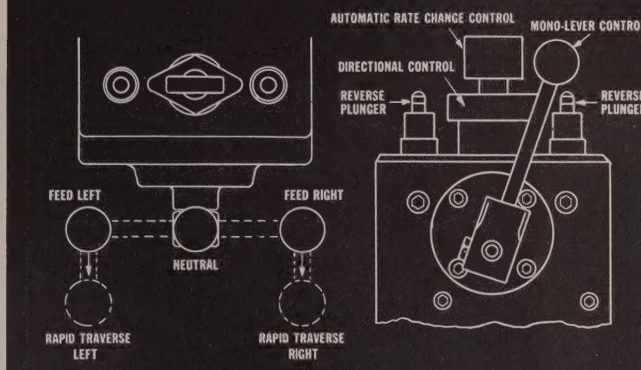
USING AUTOMATIC TABLE CYCLE AND MONO-LEVER CONTROL



1. Operator loads (A) and engages Mono-Lever. Table advances in rapid traverse to point of cut on workpiece (A) at (2).
2. Feed dog changes rapid traverse to selected table feed for cut on (A). Operator loads at station (B).
3. Upon completion of cut stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (B.
4. Feed dog changes rapid traverse to selected table feed on (B). Operator unloads and reloads at Station (A).
5. Stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (A).
6. Cycle repeats from (2).

HOW IT WORKS

AUTOMATIC TABLE CYCLE and MONO-LEVER CONTROL UNIT



LOOK AT THE JOB at left—the diagram tells how it's done. Table feed screw with adjustable nut eliminates backlash, so climb and conventional cuts are taken with equal ease. Cycle pre-set to fit operator's required load and unload time.

THINK OF IT! Now you can have all the advantages of this great cost-cutting feature plus the all-around versatility of general purpose, knee-type machines . . . faster, easier control for greater production with less operator fatigue.

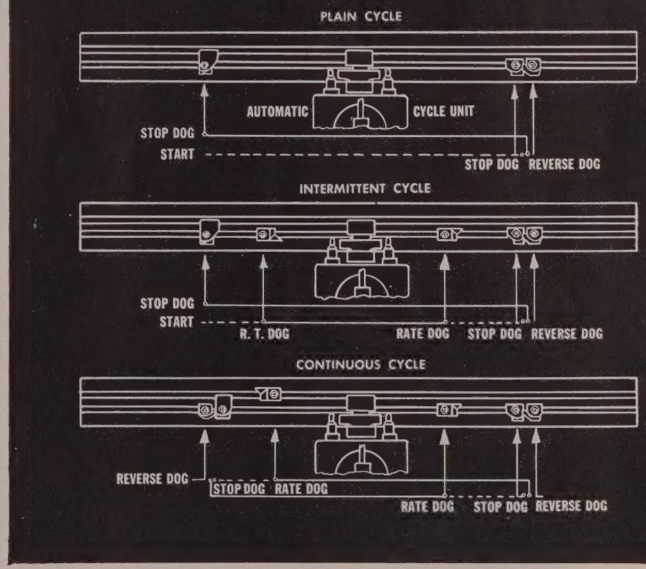
"HOW can you reduce floor to floor time on nearly all types of general purpose milling operations?"

Kearney & Trecker's research and development—always directed at getting greater production at lower costs—found a new answer to that question. It's Kearney & Trecker's new line of standard knee types with Automatic Table Cycle and *Mono-Lever* control.

They simplify hand control of the table to the simple movement of ONE LEVER—thereby substantially reducing idle cutter time and operator fatigue. They combine the all-around versatility and working range of knee-type designs with the automatic, high production feature of bed types.

Of equal importance to you is the opportunity for proper machine selection. You neither *over-buy* nor *under-buy*, but you buy *right* when you choose from the *56* machines in this new Kearney & Trecker line. For some startling facts about these machines and their application to your milling work, consult a Kearney & Trecker Sales Representative today. He's been schooled in the "know-how" and he's at your service. For detailed information, contact him or write us direct. Ask for Catalog No. AC-10A. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

TYPICAL CYCLES YOU CAN USE



THREE DIFFERENT TYPICAL CYCLES to accommodate various job setups. Using the completely automatic cycle feature effects savings of up to 31% for lots of 10 or more pieces. Cycle can be set for loading and unloading time—and can be reversed in feed or rapid traverse.

MACHINES CUT CYCLE THEIR WAY FASTER!

On the watch for wobble

There's a world of difference between *still*-fit and *operating*-fit in a ball bearing, especially at higher R.P.M.'s. Holding "wobble" or run-out to a minimum is the problem in order to maintain proper running clearances. Here's a true measure of Federal Ball Bearing precision, in manufacture and operation both...and another vital inspection stop along the Federal production line.

To prevent run-out, inner and outer races of *every* Federal Bearing are ground concentric with bore and O.D. Bores are cylindrical, not tapered or bellmouthed, and sides of the rings held parallel to each other and the ball track. Proper operating fit at high speeds is the result, with correct running clearances maintained between housing and shaft.

Taking the "measure" of a bearing to Federal's rigid standards involves over 100 individual production, inspection and cleaning operations—*with every fourth operator an inspector.* Out of this system of check and re-check, fifty years in the developing, Federal Bearings are equipped to deliver friction-free performance on any assignment.

Your application may benefit from a Federal Ball Bearing installation. Our representative will gladly talk it over with you. Write today for catalog "K." It describes the complete line of Federal Ball Bearings.

THE FEDERAL BEARINGS CO., INC. · POUGHKEEPSIE, NEW YORK

Makers of Fine Ball Bearings

REPRESENTATIVES LOCATED AT

2640 Book Tower, Detroit 26, Mich.
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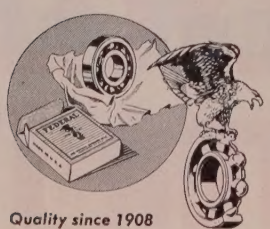
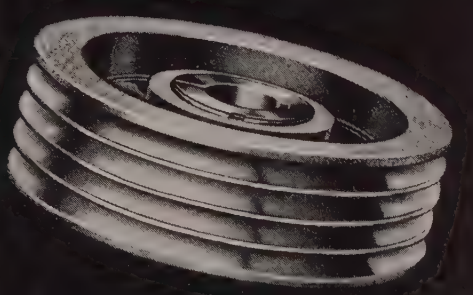


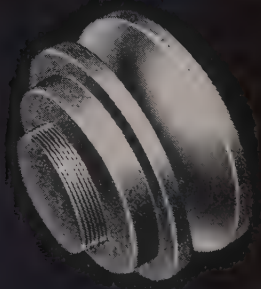
Quality since 1908

FEDERAL BALL BEARINGS

ONE OF AMERICA'S LEADING BALL BEARING MANUFACTURERS

EATON PERMANENT MOLD GRAY IRON CASTINGS *for* *Pulleys and Sheaves*





Uniform structure throughout the casting, freedom from growth and segregation, plus good tensile strength and ability to take a high surface finish—these qualities make Eaton Permanent Mold Gray Iron Castings ideal for the production of V-belt pulleys, sheaves, and similar parts. Free machinability makes for maximum production speed and low machining cost.

Eaton Foundry Division engineers will be glad to discuss the application of Eaton Permanent Mold Gray Iron Castings to your product. Send for your copy of the illustrated booklet, "A Quick Picture of the Eaton Permanent Mold Process for Producing Gray Iron Castings".

EATON
MANUFACTURING COMPANY
FOUNDRY DIVISION
9771 French Road · Detroit 13, Michigan

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Metal Fabricating Outlook for 1949

Offsetting Higher Manufacturing Costs

What metal problems will confront users of copper and brass mill products in 1949? What will be the effects of high labor costs, tightness of supplies and high prices of raw materials? Answers to some of these questions can probably be drawn from our experiences during 1948,

In an effort to maintain prices of fabricated items, in spite of rising labor costs, raw materials and supplies, fabricators are making a careful study of the many factors involved and have taken one or more of the following steps where possible:

1. Cutting down the number of operations.
2. Reducing finishing costs; extra operations; bad work.
3. Increasing operating speeds.
4. Changing type of operations to reduce finishing costs.
5. Installing more modern, labor-saving equipment.
6. Better work flow and materials handling.
7. Redesigning of product for greater simplification.
8. Reducing maintenance through better materials.

Cutting Down Number of Operations

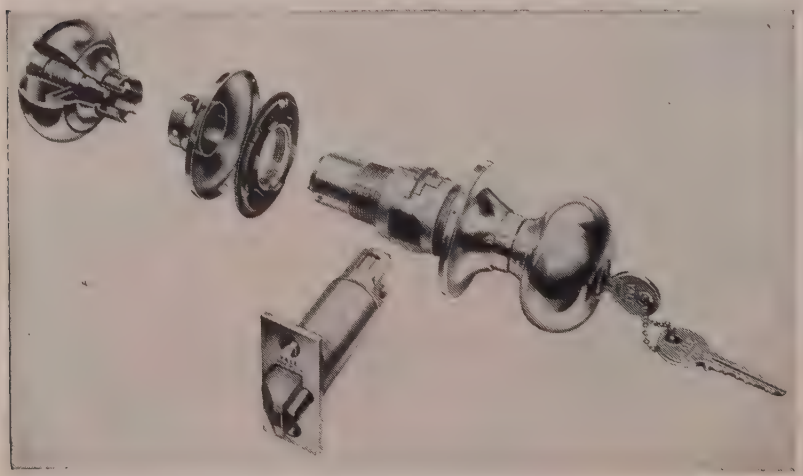
Because brass and other copper-base alloys are much more ductile than those made years ago, it is often possible to increase the severity of drawing operations between anneals, thereby cutting down the number of operations.

Reducing Polishing Costs and Spoiled Work

More attention is paid to finishing costs which involve a large percentage of labor. Careful control of annealing to produce small grain sizes and smoother metal cuts down polishing time. Much can also be done through more careful handling of both raw materials and the product itself during various stages of manufacture. Dents and scratches are expensive to remove and add much to costs and spoilage. Avoidance of tote boxes by battery grouping of operations, specially-designed trays for keeping polished work from denting, good housekeeping, respect for clean, fine surfaces all are helpful measures. Constant watching of excessive scrap and frequent analyses of costs involving expensive "extra operations" bring in unexpected dividends.

Cutting Costs and Improving Quality Through Redesign of Product

Redesign has played an important part in the builders' hardware field to bring down both cost of manufacture and installation by the consumer. For example, large, heavy front door locks with cast brass handles and escutcheon plates are rapidly being replaced by a smaller, lighter but much more efficient product. Door knobs and escutcheons are made from sheet brass by stamping or forming. The new locks are also more ingenious. The lock body is cylindrical in shape, requiring only two drilled holes in the door for rapid and inexpensive installation. Compare this to the old fashioned front door lock, which requires a large mortise by a skilled carpenter. The cost of installation was often higher than the price of the lock itself! Redesign of the product is, of course, helping other industries to increase sales appeal and often to reduce cost of manufacture.



Redesigned for modern styling and economical installation, the new Yale heavy-duty tubular lock is packed in pre-installation units. Double thickness of strip brass in the door knob prevents denting. Streamlined wrought brass escutcheons have replaced castings. Courtesy Yale & Towne Manufacturing Company, Stamford, Connecticut.

Increasing Operating Speeds

Many manufacturers have succeeded in speeding up their machining operations by changing to a free-machinable alloy. For example, the use of leaded Naval Brass instead of regular non-leaded Naval may double machinability without greatly affecting the strength or corrosion-resistant properties. Longer tool life and faster cutting speeds for tough alloys can often be attained by using the correct tool shape, a change to carbide or other harder tool materials, or by using the proper lubricants or coolants, which quickly draw away the heat generated by the cutting operation. Our laboratory has helped customers greatly in this respect.

Change in Operations to Reduce Finishing Costs

Change in methods of fabrication of the product may bring appreciable economies. One manufacturer, tired of the excessive cost of polishing rough sand castings of brass, redesigned the part by using a number of screw machine parts made from free-turning brass rod, which could be polished on automatic equipment. Another evolved a method of making a part from tubing by cold forging without changing the physical appearance of the finished part appreciably. This item had been made from sand cast brass for many years.

Changes from castings to hot and cold forgings have also taken place. Aside from lower finishing costs, a better article is often made from wrought metal as against a casting, doing away with the problem of poor castings, porosity, and rough surfaces.

Better Work Flow and Materials Handling

Rearrangement of machines and equipment to eliminate awkward handling; integrating departments to avoid unnecessary transportation from one room to another; more liberal use of modern conveyor systems and methods will increase production and cut labor costs. In fact, any speed-up of scheduling which will reduce the time of fabrication will bring savings resulting from more rapid turnover of investment. *(Continued on next page)*

1948 Index in Preparation

Get your copy of the Annual Index to the Copper Alloy Bulletin by writing to Bridgeport Brass Company and asking that your name be added to the Copper Alloy Bulletin mailing list. Those already on the Bulletin mailing list will automaticaly receive copies, now in preparation.

METAL OUTLOOK

(Continued)

Reducing Maintenance by Using More Corrosion-Resisting Metals

Corrosion, the enemy of all metals, is finding more opposition from copper and its alloys. Destruction from corrosion means expensive maintenance, shutdowns, repairs and eventual replacement, all of which involve high labor costs. As a result, more attention has been given during the past year to specifying more corrosion-resisting alloys and combinations of metals. This explains the unprecedented demand for copper tubing for plumbing, heating and refrigeration lines, and for water wells. Copper tubing is also replacing outworn, rustable underground gas mains.

Outstanding is the large increase in the use of Duplex Tubing — copper-steel for ammonia refrigeration and for the handling of nitrogen compounds. Much saving has been effected over steel tubing because of increased service life, better heat transfer and reduced maintenance. Other combinations of Duplex Tubing are doing much for the processing of petroleum products, chemicals and foods.

Serious pollution of streams and harbors is responsible for a wider use of corrosion-resisting Duronze IV* (aluminum bronze) and Aluminum Brass condenser and heat exchanger tubing in the power, marine and chemical fields.

To fight corrosion from moisture and weather we find that manufacturers are using more silicon bronze alloys for bolts, nuts, screws, marine and pole line hardware, equipment for waste treatment and sewage disposal plants, paper mills, etc. Duronze III* (silicon aluminum bronze) and other aluminum bronze alloys are also more generously used for valve stems, pump parts, valve seats to reduce wear and increase service life.

To sum up briefly — metal fabricators are meeting rising costs by more carefully selecting metals and alloys that are physically suited to their requirements as exactly as possible, are tightening up on their manufacturing operations, and changing methods of manufacture for greater economy.

Progress at Bridgeport Brass

Many gains have been chalked up on the plus side of the ledger. 1948 was a high production year for the Company. At Bridgeport, Connecticut, the mills worked at capacity practically all of the time. New production records were made by our Tube Mill as more and more of the new equipment swung into action.

Our new mill at Indianapolis also greatly benefited from the additional equipment which made possible the production of commercial gauges of strip and sheet and a full range of rod sizes and shapes. Its substantial volume of copper water tubing in straight lengths and coils also helped its growing production picture. Thanks are gratefully extended to our Mid-Western and Western customers for their support rendered to this great new mill.

With many unsolved problems at home and abroad, 1949 promises to be a year of changing conditions. Customers should feel free to call upon our laboratories in Bridgeport and Indianapolis, as we wish to be as helpful as possible in regard to their metal problems. *Reg. U. S. Pat. Off.

For fabrication of the many thousands of articles of everyday use, Bridgeport offers a wide choice of alloys in many forms. Modern mills in Bridgeport, Conn., and Indianapolis, Ind., and a staff of experienced laboratory-trained men are ready to help our customers quickly with their metal problems.

Sheet — Rolls, Strips — Brass, Copper, Nickel Silver, Phosphor Bronze, Silicon Bronze, Aluminum Bronze for drawing, spinning, stamping, forming.

Rod—High-Speed, Free-Turning Brass and Duronze III Aluminum Bronze for screw machine operations. Also, Naval Brass, Silicon Bronze, Aluminum Bronze. Bronze Welding Alloys.

Wire—Brass and Silicon Bronze for making screws, rivets, bolts, nuts, nails. Phono Electric Bronze trolley wire.

Tubing—Copper for plumbing and heating; Condenser and Heat Exchanger Tubing; Brass and Copper pipe.

Plumbing Brass Goods. Traps, sink plugs, basket strainers, bath wastes, basin supplies, shower curtain rods; radiator air valves for one-pipe steam heating systems.

Automobile Tire Valves — for passenger cars, trucks, farm tractors — valve caps, cores, gauges.

Aer-A-Sol Insecticide—DDT pressure container type for killing household insects.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Circular Slide Rule, only 4½" in diameter, can be used to multiply, divide, determine squares, square roots, cubes, cube roots, reciprocals and proportions. **No. 901**

Automatic Loading Devices for rotary and rack type gear finishing machines are said to maintain production rates as high as 300 pinions per hour per machine by means of gravity chute feed, eliminating need for arbors to mount gears and pinions. **No. 902**

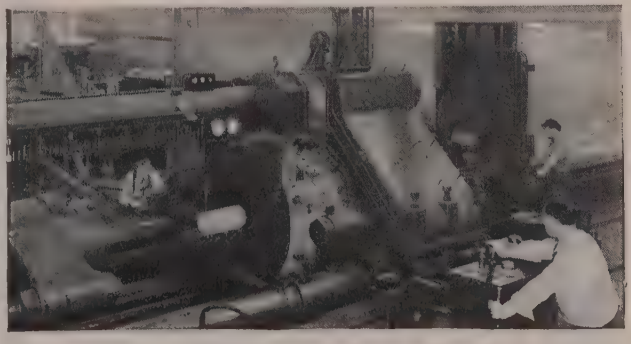
New Miniature Lathe is said to combine features of standard lathes with specialized design of jewelers' lathes for use in machine shop, tool room and laboratory as well as by watchmaker and jeweler. Measures 10½" x 7¼" x 3¾", with speed range from 100 to 3000 rpm. **No. 903**

Vernier Scale Magnifier, essentially an optical glass 3½" to 4 power lenses in spring brass frame, clips over head of reading scale to simplify accurate reading on both sides of vernier calipers. **No. 904**

New Metal Castings Sealant is reported to permit salvage of many castings rejected due to porosity. Impregnation is by vacuum pressure method, suitable for aluminum, magnesium, bronze, steel and gray iron, it is claimed. Anodizing or plating coatings can be applied, and sealant resists hydrocarbons, water, salts, solvents and moderate acids or alkalis. **No. 905**

Self-Feeding Tube Expanders are claimed to provide uniform expansion through entire thickness of sheet. Designed for precision rolling of condenser tubes from ½" to 1½" od, units are said to be particularly effective in rolling bimetal tubes. **No. 906**

Pocket-Size Plater's Computer is said to furnish data quickly for all types of plating operations, such as plating time to deposit given thickness of metal, current density required to deposit given thickness, thickness resulting from established plating time at known current density, cathode efficiencies of plating solutions, etc. **No. 907**



Indianapolis Plant of Bridgeport Brass—powerful 3850-ton extrusion press making brass rod from a red hot billet.

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL

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Current Trends in Good Brazing Practice

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 124, NO. 1 JANUARY 3, 1949

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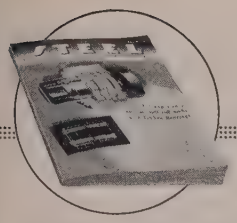


January 3, 1949

Corrective Factor

American industry enters the new year in an atmosphere which differs only in degree from those prevalent in every January since 1933. Today there are the same uncertainties about national and international affairs, the same doubt as to the ability of our government and other governments to cope with them effectively, the same fears that something in the forthcoming year will be seized upon by our government as an excuse for proclaiming another emergency for which unusual powers should be granted to the President, and the same avowed desire of the government to expand social reforms notwithstanding the fact that the nation cannot afford additional expense at this time.

Businessmen have become hardened to these repeated threats. They realize that the program of the President, which is influenced strongly by political considerations, must run the gantlet of Congress in which there are enough conservatives in both major parties to provide a brake against recklessness. Nevertheless, the over-all trend in public sentiment, which will be reflected in the 81st Congress, is moderately leftish.

This means that at the beginning of 1949 the chances that President Truman may obtain congressional approval for part of his program appear to be bright. However, the demands he makes in his messages to Congress will not be acted upon immediately. As time goes on while both houses debate his proposals, a force which has been absent from the national scene for a long time will be gaining strength. This force is the almost forgotten natural law of supply and demand.

This is the law which was partly suspended by edict in prewar days and was shelved completely during the war. Since V-J Day it has not been much in evidence because the nation generally was in a sellers' market. In 1949, as a buyers' market extends to more and more commodities, the power of the law of supply and demand will be felt more keenly.

It is the new element which may effect adjustments which man has been unable to accomplish. It may combat inflation, reduce prices, increase productivity, weed out incompetency, restrain reckless spending and generally promote sanity more effectively than can any other agency.

It could easily exert a powerful corrective influence in 1949.

* * *

AS AMERICAN AS PIE: If one were seeking an epical theme of Americana for 1948, he would do well to choose the automotive industry.

According to Detroit Editor Art Allen, the automotive industry is 56 companies building 21 makes of passenger cars, 39 makes of trucks and 20 makes of motor busses; 1000 body and parts plants; and 20,000 other companies furnishing materials, supplies, equipment and services.

In 1948 this great segment of industry in the United States and Canada turned out more than 5,500,000 cars and trucks, a record exceeded only by the 5,621,000 units produced in 1929. On the basis of poundage or dollar value, the 1948 performance far excels that of 1929.

This record was achieved in spite of serious handicaps. Steel was scarce for old established automobile builders and even more difficult to obtain for newcomers. Nevertheless old and new managed to get enough steel to establish a new record of physical output.

Labor difficulties were aggravating. Each builder had to make peace with the various unions representing its employees. In addition,

(OVER)

each was harassed by strikes in the plants of suppliers. Yet in the midst of these troubles, somewhere in the industry the 100 millionth car rolled off an assembly line without ceremony.

Where in all the world can one find anything to compare with the vitality and resourcefulness of this industry? It is as distinctly American as Christmas turkey or pumpkin pie. —p. 163

* * *

CLARIFICATION NEEDED: Looking forward into 1949 from the standpoint of producers, distributors and consumers in the metalworking industries, nothing could be more welcome than clarification of the pricing situation and a sensible decision regarding labor legislation.

As to the former problem, it is important that our lawmakers understand that mill pricing imposes hardships upon tens of thousands of companies which under no stretch of the imagination could be charged with desire to evade antitrust laws. As to labor relations legislation, it is important for lawmakers to remember that the one-sidedness of the Wagner Act, which caused a majority in both houses to pass the Taft-Hartley Act over the President's veto, is as wrong today as it was when T-H was enacted and that the public still needs protection against abuse of power by unions. —pp. 121, 126, 129

* * *

SEE NEW ERA IN STEEL: Recent experience with a number of new processes convinces many furnace and mill operators that drastic changes in iron and steelmaking practice may be expected soon.

During the past year the use of oxygen in blast furnaces, open hearths, bessemer converters and electric furnaces gained momentum. Blast furnacemen talked more positively about the imminence of a 2000-ton stack with 30-ft hearth, burdened with beneficiated iron ore, a good grade of sinter and charged with a fast-burning coke. Interest also was displayed in the continuous casting process developed jointly by Republic Steel Corp. and Babcock & Wilcox Co., by which many tons of electric furnace steel in carbon and alloy grades have been converted into slabs and oval billets in a pilot plant at Beaver Falls, Pa. Refinements in some of the new rolling mills recently installed are spectacular.

These and other developments are grist for the steadily grinding mill of evolution in iron and steel production methods, which will bring greater efficiency and conservation of raw materials. —pp. 140, 250

* * *

EUROPEAN GAINS HELP: Considering the extent to which the United States has concerned itself with Europe's problems, one of the most hopeful portents for the new year is the progress of recovery in Western Europe. European nations, excluding Russia, produced 49 million net tons of steel in 1948 compared with 40 million in 1947, a gain of 23.5 per cent.

Somewhat important is the fact that much of this improvement came about before the Marshall Plan became effective. ERP's estimate of steel production for Marshall Plan European countries in 1948 was 40 million net tons. Actually it was 43 million tons. Marshall Plan benefits, which began to be felt late in 1948 and should be influential in 1949, may be potent enough to create a situation where aid to Europe may be reduced throughout the ensuing year.

Western Europe's rise from a desperate situation is an encouraging factor in the still troublesome world scene. —p. 150

* * *

AIDS TO COMPETITION: In accordance with established practice, the editors asked several hundred eminent authorities to contribute to this publication's annual forum on technical progress in the metalworking industries. Their comments indicate that currently significant developments are unusual as to number and variety.

Among the scores of important activities may be mentioned the extent to which demand for better alloys for aircraft is intensifying research in many lines, how sweeping changes in forging methods are slashing costs, how non-destructive testing is becoming virtually an integral part of the production line, how "automaticity" is finding high favor among equipment manufacturers and machine tool builders, how "tailor made" irons are in greater demand among users of castings, how refinements in joining and welding facilitate fabrication and how low-temperature enamels portend a new era in finishing.

The contributions of these and many other advances in technology will be doubly welcome as industry encounters the keener competition of a buyers' market. —pp. 185-286

E. L. Shaner

EDITOR-IN-CHIEF

Summary

PROSPECTS FOR 1949— With a thumping $71 billion volume recorded for 1948, the metalproducing and metalworking industries are carrying over into the new year with considerable momentum (p. 121). Although some soft spots are appearing in demand, particularly in consumer goods, the coming 12 months should be an active, if not a record, period. Requirements for capital goods, defense and foreign aid should continue at high level, at least partially offsetting a leveling off in the lighter goods.

HOW MUCH STEEL— During the closing months of 1948, steel mills were operating at around 100 per cent of capacity producing steel at a record annual rate of 94 million tons. Demand for some metalworking products was slackening, arousing speculation as to an impending balance in steel supply and demand (p. 143). As the new year starts, pressure on mills for material continues heavy. Producers can see no easing in demand, although they are on the alert for an abrupt change, which has happened before under similar conditions and which they admit may occur again. Nonferrous metal shortages (p. 146) will be aggravated by government stockpiling programs.

LABOR—Encouraged by the November election results, organized labor is preparing to launch several new campaigns (p. 126). One of these will be directed toward obtaining legislation long desired by the unions— a more favorable labor-management relations act, a government-sponsored low-cost housing program, wider social security program, price control, higher minimum wages and government participation in industrial expansion. Another will be pointed toward more thorough and effective organization of the nation's workers. Still another apparently will be aimed at cleaning out the Communistic elements among union leadership.

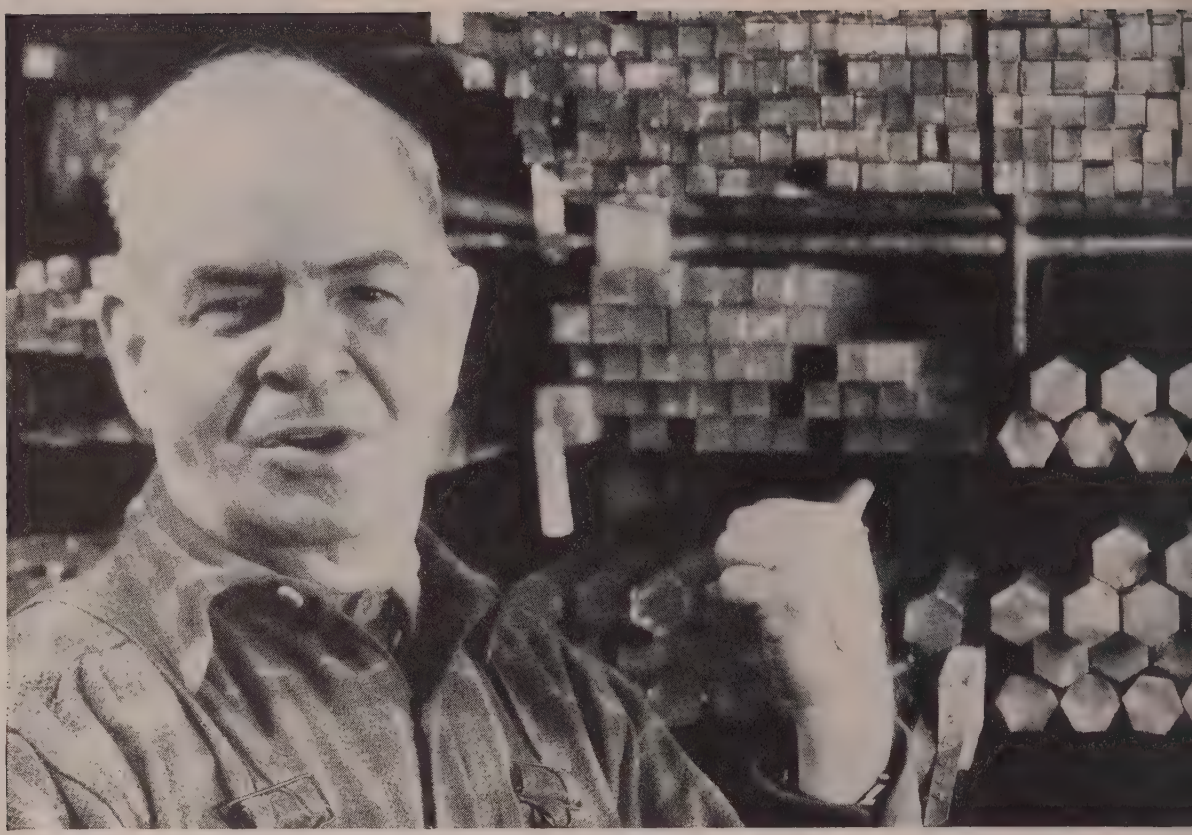
PRICING—One of the most perplexing problems to be faced by the metalworking industries during 1949 will be that of pricing policies (p. 129). Eight months of debate, interpretations, analyses and congressional hearings have done little to clarify the muddle created last April by the Cement decision outlawing the historic basing point system. Metalworking executives hope the 81st Congress will enact legislation to clarify the matter.

RAW MATERIALS— The acute scrap shortage which has plagued steelmakers and foundries since the outbreak of the war (p. 138) is showing some improvement. Short-term supplies are comfortable and prices fairly stable. Interest in future supplies of iron ore is intensified (p. 135) by the diminution of high-grade Lake Superior reserves, by programs to beneficiate low-grade ores of that region and by the development of rich new deposits, particularly in Quebec-Labrador.

EUROPEAN RECOVERY— The war wounds of western Europe are beginning to mend (p. 150). Production in 1948 showed substantial increases over the preceding year. This year, the billions of American dollars being poured into Europe through the Marshall Plan (p. 154) should accelerate recovery. In eastern Europe, Russia and her satellites are struggling to build a more effective capital goods industry, and have recovered to prewar production levels (p. 156).

STATISTICS—Figures on metalworking production, capacity, distribution prices, wages and employment are contained in a statistical section in this Yearbook of Industry (pp. 295-334).

TECHNICAL PROGRESS— Predictions by more than 190 key men in the metalworking and metalproducing industries promise intensified technological programs to step up metal production and to increase the efficiency of fabricating techniques (pp. 185-286). New steelmaking practices, including use of oxygen and higher air pressures, are on the increase (p. 140) while steelmakers are considering the building of huge new blast furnaces, capable of producing 2000 tons of iron daily. Metalworking executives have found many and are seeking more shortcuts to improve the efficiency of their plants (p. 181).



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Sure, we've got steel—tons of it. Many kinds and shapes, thousands of sizes.

But we've got trouble, too—and plenty of it! We haven't got enough of the particular kinds of steel that everybody seems to want. That's simply because more people want more steel these days than ever before.

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By B. K. PRICE
Eastern Editor, STEEL

Business Prospects UNDER the TRUMAN NEW DEAL

Metalworking activity to continue at high level in 1949 despite soft spots in some consumer durable goods. Defense requirements, aid to Europe and heavy demand for capital goods to bolster economy

METALWORKING executives are looking forward to another active, if not record-breaking, year in 1949. Although the full-blown optimism of a year ago has been toned down considerably, the strong demand in capital goods lines and the requirements for national defense and foreign aid are expected to forestall any serious setback.

Admittedly there are disturbing factors: Shrinking backlogs in some consumer durable lines, as well as soft goods; carloadings down from the preceding year; business inventories heavier; declines in farm prices; increasing spottiness in retail business; decline in housing demand, with many prospective home owners priced out of the market; and softer wholesale prices.

Add prospects of heavier corporation taxes and possibly excess profits taxes; a possible turndown in industrial expansion by midyear; the high cost of everything; a continuation of the pricing muddle stemming from Federal Trade Commission orders and high court decisions; uncertainty abroad; and uncertainty as to what the 81st Congress will do under its new leadership, and what the President, fresh from his "upset" victory, will demand of it. There are still other unsettling factors, not the least of which pertains to labor and its drive for still higher

NATIONAL INCOME, NATIONAL GROSS PRODUCT SINCE 1929

(Billions of Dollars)

	National Income	Gross National Product
1929	87.4	103.8
1930	75.0	90.9
1931	58.9	75.9
1932	41.7	58.3
1933	39.6	55.8
1934	48.6	64.9
1935	56.8	72.2
1936	64.7	82.5
1937	73.6	90.2
1938	67.4	84.7
1939	72.5	90.4
1940	81.3	100.5
1941	103.8	125.3
1942	136.5	159.6
1943	168.3	192.6
1944	182.3	210.6
1945	182.8	213.1
1946	179.3	209.3
1947	202.5	231.6
1948†	224.0	253.0

† Estimated.

Source: Department of Commerce.

U. S. REVENUES, EXPENDITURES, DEBT

Year	Total Receipts 000,000	Per Capita Receipts	Expenditures 000,000	Per Capita Expenditures	Gross Debt 000,000	Per Capita Debt
1915	$ 698	$ 7.03	$ 761	$ 7.66	$ 1,191	$ 11.83
1916	782	7.77	734	7.29	1,225	11.96
1917	1,124	11.00	1,978	19.36	2,975	28.57
1918	3,664	35.38	12,697	122.58	12,243	115.65
1919	5,152	49.07	18,523	176.40	25,482	240.09
1920	6,695	62.83	6,482	60.84	24,297	228.32
1921	5,625	51.98	5,538	51.18	23,976	221.09
1922	4,109	37.40	3,795	34.54	22,964	208.97
1923	4,007	35.93	3,697	33.15	22,349	200.10
1924	4,012	35.44	3,507	30.98	21,251	186.86
1925	3,780	32.91	3,529	30.73	20,516	177.82
1926	3,962	33.98	3,584	30.76	19,643	167.70
1927	4,129	34.94	3,493	29.56	18,510	156.04
1928	4,042	33.73	3,643	30.40	17,604	146.69
1929	4,033	33.19	3,848	31.67	16,931	139.40
1930	4,177	33.01	3,994	32.42	16,185	131.49
1931	3,190	25.70	4,091	32.99	16,801	135.37
1932	2,005	16.06	4,948	41.28	19,487	155.93
1933	2,079	16.54	4,325	40.91	22,538	179.21
1934	3,115	24.64	6,370	56.19	27,053	213.65
1935	3,800	29.88	7,583	58.00	28,701	225.07
1936	4,115	32.17	9,068	69.41	33,545	261.20
1937	5,028	40.93	8,281	62.69	36,427	281.82
1938	5,854	47.89	7,304	59.70	37,167	285.43
1939	5,164	43.21	8,765	70.65	40,445	308.34
1940	5,387	44.09	9,127	70.65	42,967	325.63
1941	7,607	57.29	12,774	74.16	48,961	367.54
1942	12,799	95.25	32,491	241.80	72,422	537.35
1943	22,281	163.25	78,182	572.83	136,696	1001.55
1944	44,149	319.92	93,743	679.29	201,003	1455.52
1945	46,456	332.78	100,404	719.25	258,682	1853.01
1946	43,037	305.25	65,018	461.17	269,422	1910.97
1947	44,703	311.77	42,505	296.44	258,376	1801.94
1948	44,746	306.24	39,326	269.14	252,292	1726.68

Annual Statements of the Treasury.

wages and repeal of present labor-management relations statutes.

Yet the very presence of these uncertainties, and the importance of maintaining an active economy from both a national and international aspect, may work for a closer and more effective relationship between Washington and business and even labor and business.

New Peacetime Record—Meanwhile the metalworking industries have carried through into 1949 with considerable momentum. Last year these industries marked up a new peacetime record volume of business, totaling $71 billion. This compares with $62 billion in 1947, $43.2 billion in 1946 and $19.5 billion in 1939. Industries included in this category are the producers of primary metals, fabricated metal products, machinery, electrical equipment and transportation equipment.

Both prices and physical volume contributed to this new record, with prices contributing relatively more than physical volume. Last summer, steel prices underwent the sharpest gains in recent years, and nonferrous metals advanced rapidly. As in previous postwar years, volume was restricted by supply.

This year, assuming no major upheavals, a closer relationship between these two factors should develop, as steel prices, for instance, have gone further over recent months in bringing revenue in line with costs, plus a reasonably good margin of profit, than at a time since the war. In percentage of gain, they s lag well behind prices of most other basic comm ities, and the break-even point for the industry still high, in excess of 80 per cent. But indicatio point to a leveling off. Moreover, the renewed thre of price controls—possibly of a "standby" nature may have restraining effect.

Supply To Improve—Steel this year should be better supply. Production facilities will be larger, a while a somewhat increased amount may be syphon off for export (maybe 5,500,000 tons, as compar with an estimated 4,340,000 tons in 1948) the amou available for certified and non-certified work in t country should be greater.

Ingot capacity as of the beginning of last ye was 94,200,000 tons. By early this year it shou be up to an estimated 95,500,000 or 96 million to Outlook for raw materials, pig iron, coke, scrap a ore, is generally improved.

This betterment became apparent in the closi months of last year, with major repair programs blast furnaces and coking facilities nearing compl tion, with substantially heavier importations of scr and pig iron augmenting the domestic supply (po sibly 150,000 tons of pig iron came in during 194 with close to two-thirds of it in the last half), wi coal in much better volume and of better qualit and with new washing facilities being installed, a with increasingly heavy shipments of ore.

Conditions Vary—Conditions in major metalwor ing lines have become increasingly mixed. Orde continue heavy from electric utilities, oil and chemi plants and oil and gas transportation companie Freight car builders still get priority tonnage. Au passenger car output reached a new postwar peak 3,860,000, up 300,000 from 1947, and prospects a still strong.

Agricultural equipment demand, however, h eased, gray market and premium prices having v tually disappeared; construction equipment is off, though partly seasonal; and evidences appear of shift from a buyers' to a sellers' market in a numb of the lighter durable lines. Pressure for washi machines is off, with around 4,400,000 units produ last year, more than in the three prewar years 1938, 1939 and 1940 combined.

Office equipment is available for immediate d livery in most cases. Less radio demand last y dropped production to 16 million sets, from 22 mill in 1947. An easing in stove demand, especially the so-called luxury models, has developed, with estimated 1,100,000 ranges being produced last y Bicycles, tricycles and wheel toys are easily obta

ble, and there is continuing less pressure for fractional horsepower motors. Weak spots are developing some foundry lines.

National Income High—While some segments leveled off, the country's overall economy last year reached a new peacetime peak. National income was estimated at $224 billion, against $202.5 billion in 1947, and $179.3 billion in 1946, the first full postwar year. Gross national product, according to latest figures, was at an annual rate of $253.0 billion, against 231.6 billion in 1947; and $209.3 billion in 1946. However, as the year advanced there was a gradual easing in demand for non-durable goods, and, as previously indicated, some contraction in that for consumer durables as well. Nevertheless, latter buying was generally strong, with expenditures still limited principally by availability of supply.

As production rose and requirements became less pressing, inflationary trends were less pronounced. During the first half wholesale price increases amounted to about half as much as in the corresponding period of 1947, due in part to the general improvement in farm crops. Metals and metal products, of the commodity groups, were virtually the only exceptions, with the upward trend in prices continuing throughout the greater part of the year, and with the sharpest jump in steel occurring in mid-summer, following the third round of wage increases throughout the industry.

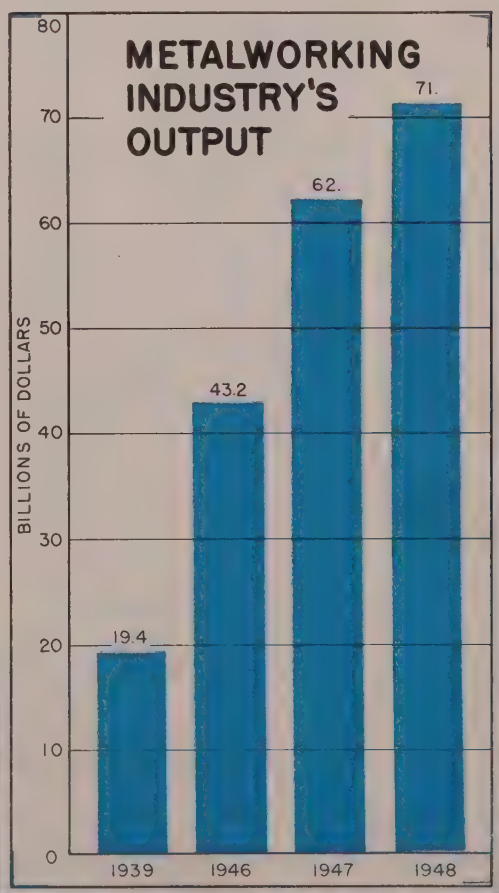
Defense Requirements To Rise—Defense and foreign aid requirements to date have had relatively small direct bearing on steel tonnage-wise—as for strictly military needs, they have been definitely minor, amounting to little more than 102,500 tons per month. Yet indirectly the requirements of these programs on steel and other metals and on the entire economy of the country have been important—perhaps suggesting, in a sense, that certain percentage which often spells the difference between good and bad business, but in this case, more likely, the difference between scarcity and a reasonably adequate, comfortable supply.

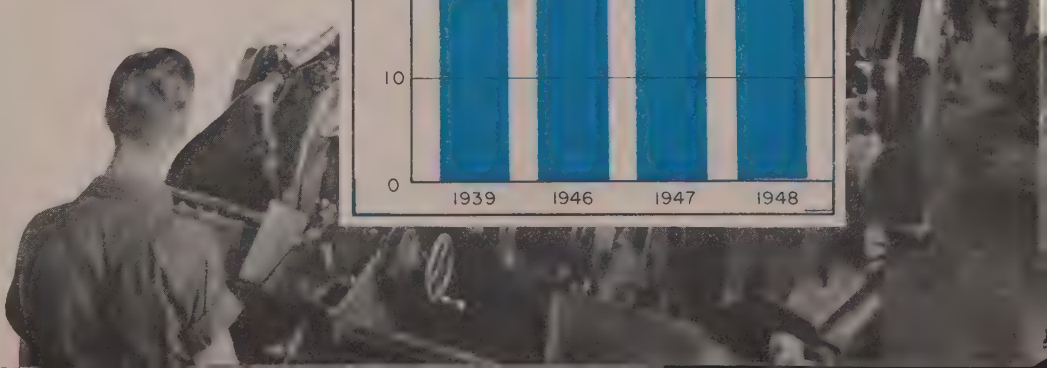
During the current year these demands are likely to become substantially heavier. The President's announced ceiling on the budget for the armed forces, starting next July is $15 billion, or $3 billion above current expenditures, and the probability is that spending will at least equal the proposed ceiling, if not eventually force a still higher one. Last summer the military services asked for a budget of $23 billion, only to be confronted with the proposed $15 billion ceiling. However, the services haven't given up trying to obtain more funds, and, if the situation abroad should worsen, they may be successful in getting more.

This possibility of a still larger defense budget was recognized (although the idea was discouraged), when Dr. Edwin G. Nourse, chairman of the President's Council of Economic Advisers, recently warned that even a rise of $3 to $5 billion over the ceiling would have inflationary repercussions. This could mean, he said, a federal deficit or higher taxes, shortages of labor and materials and "price controls of quite extensive scope."

Dr. Nourse also made another significant statement, when he asserted that except for the enlarged defense program and foreign aid "deflationary influences would by this time have become clearly evident," all of which points up the continued importance of these programs as inflationary factors in the months still to come.

Foreign Aid Accelerated—Presidential order late last year for full-speed-ahead on the Economic Cooperation Administration program authorizes the spending of the major first year appropriation of $4 billion in 12 months, or by Apr. 2, instead of stretching the money through June, as previously proposed. However, as this move had been anticipated, the 12-month rate of spending had been in effect for some time. Nevertheless, ECA will have to ask for a sup-





A record volume of goods, $71 billion, was produced by the metalworking industries in 1948, more than 3½ times the volume in prewar 1939. The steady rise in postwar volume is due to both increased production and higher prices

plementary appropriation for the period between Apr. 2 and June 20; request for more than $1 billion is contemplated.

Mandatory Controls Uncertain—Prospects for mandatory allocation controls of scarce materials appear to depend much upon the trend of conditions after the year gets under way. They, along with higher corporate taxes, further restrictions on credit and possibly "stand-by" price controls have been most frequently mentioned as likely to be included in whatever "anti-inflationary" program the President proposes to the 81st Congress. However, if voluntary allocation controls, such as have been applied in steel, continue to function satisfactorily, mandatory action may be delayed indefinitely. Much depends, in particular, upon defense requirements.

Public Law 395, governing voluntary allocations, is due to expire Feb. 28 unless extended by Congress. However, should it be allowed to expire, producers are prepared to continue allocations on a unilateral basis for six months, under an interpretation of a provision of the law by Attorney General Tom Clark.

Meanwhile, the President, under the authority of the 1948 Draft Act, has the right to assign priorities to military orders and require manufacturers to devote a certain portion of output to military needs. He can even take over plants and equipment if producers are unwilling to supply necessary requirements for defense. However, this power has not been used, as the military program to date has required only a small fraction of scarce materials, and there has been no unwillingness on the part of manufacturers to meet needs.

Enthusiasm for Price Controls Lacking — As for price controls, there is little real enthusiasm in Congress for such a measure, and while "stand-by" controls may be applied to scarce items, there is doubt that any action will be taken without first a thorough survey of conditions and prospects as they then exist.

Wage and salary increases from the third quarter in 1947 to the same period in 1948 in all non-agricultural industries underwent a further expansion, aggregating $11 billion. Increase in wage rates was a major factor, although there was some expansion in employment. Hours of work were virtually unchanged.

Government forecasters predict that employment will remain high well into this year, with demand for labor for steel and other durable goods industries and for defense and export more than offsetting slackening employment in textiles, shoes, furniture and other light consumer goods. Skilled workmen in the metal trades will be in increasing demand, with particular pressure from the aircraft industry in the latter half of the year. October employment last year hit 60,134,000, about 1 million more than in October, 1947.

Basing Point Pricing Abandoned — Outstanding pricing development last year was the abandonment of the multiple basing point system by steel producers. Announcement by United States Steel Corp. on July 7 of intention to set up a mill pricing system fairly rocked the steel and metalworking industries and tremors haven't subsided yet. This action, which soon became industry-wide, has led to confusion perhaps unparalleled in the long history of the steel and metalworking trades.

The action, voluntary in general nature, came in recognition of the principle laid down by the Supreme Court in its decision upholding the Federal Trade Commission order in the Cement industry case; it came in recognition of, but not, it might be added, in agreement with the principle, for leading steel producers took the position that use of the basing point system was evidence of competition, not of its absence, as claimed by the commission.

Sen. Homer E. Capehart, (Rep., Ind.), chairman of the Senate Trade Policies Committee, after hearing extensive testimony in the closing weeks of the past year as to how the change in pricing policy has handicapped many steel buyers, declared that Congress should pass a law permitting business to absorb freight as it sees fit, so long as there is no collusion or conspiracy involved. Remedial legislation by Congress is being pressed by wide segments of business and industry.

Prices Rise—STEEL's weighted finished steel price composite, based on the prices of leading finished products adjusted to the volume of each sold, was 4.143c per pound in November, compared with 3.577c for June, prior to the major advances of last July.

Meanwhile, gray market operations were still reported, with some of the light flat products going at three times mill prices, and even higher. Efforts on the part of producers to curb these operations met with some success, however.

Corporate Profits Up—Total corporation net profits for the country last year are estimated to have run in excess of $20 billion, as against $18 billion in 1947 and $12 billion in 1946.

In steel these profits were estimated to have reached more than $500 million for a new all-time peak, sur-

assing the previous record of $454,600,000 in 1929 which latter figure was nearly surpassed in 1947). However, last year's profits, as in other recent years, ell far short of being true profits, particularly in view of high replacement costs for plant and equipment and the continued sharp rise in inventory values. Interestingly, last year's showing of more than $500 million was made on a dollar volume of sales of more than one and a third times larger than in 1929, when the previous high net was made.

An increasing number of companies are now setting aside heavier reserves to meet higher plant and equipment replacements, increasing costs of raw materials,

Fractional horsepower motors, one of the tightest items of supply among metalworking goods 18 months ago, now are in fairly adequate supply. Photo shows production line of a midwestern manufacturer

nd so forth. United States Steel Corp., in the third quarter of last year made extra depreciation charges f $13,500,000, almost double the $7,100,000 earmarked for such purposes in the corresponding period f 1947. Various other leading steel companies are etting aside special depreciation reserves.

In viewing tax prospects, business leaders can't quite forget that one of the eight measures President Truman proposed to Congress last summer to combat nflation was an excess-profits tax. They regarded t then as far too drastic, and do so now. It might vell do more, they claim, than merely check inflation or cause a mild easing off; it would tend to reduce roduction, when production is still badly needed, nd discourage expansion in many important direcions, they contend.

Since last summer natural forces have relaxed inflationary pressure to a certain degree, but whether sufficiently to cause any material change in the administrative viewpoint in Washington remains to be seen. Many business men believe that when the time comes such action will not be taken. But pending developments, they are moving cautiously. They continue pessimistic over the possibility of more liberal tax allowances for depreciation; nor do they see an ending to double taxation of corporate income paid out as dividends.

While current government expenditures are running close to $43 billion, conservative estimates place the budget for the new fiscal year at $45 to $47 billion, with $15 billion earmarked for armaments. Hence, higher taxes, beginning with corporate taxes in some form, probably will materialize.

Expansion Outlook Clouded — High construction costs and uncertainty with regard to the future tax program, pertaining particularly to excess profits and accelerated amortization has beclouded the outlook for plant expansion. However, government forecasters predict a new dollar value record for all types of construction for this year of $18.75 billion, although allowing that physical volume will be about the same as last year, and some leading industrialists indicate no curtailment in their respective programs. Significantly, United States Steel Corp.'s authorizations for expansions and improvements since V-J Day stood at the end of the third quarter at $775 million. Today, three months later, they are estimated at $900 million, and, it might be added, apply only to developments at present plant locations.

In estimating an increase in general construction over last year's $17.8 billion, government officials say that more public buildings will be erected, but fewer homes, and that new private construction will shade the $13.7 billion for 1948. Estimates for new public building total about $5 billion, up 24 per cent.

Corporation expenditures for plant and equipment during the first 9 months of last year amounted to approximately $9 billion, an increase of $2 billion over the same period in the preceding year. This amount was approximately equaled by retained earnings and depreciation allowances, and represented about two-thirds of capital needs, against one-half in the preceding 2 years, when short-term capital requirements were heavier.

Freight Rates Going Up—Still higher freight rates may become effective before the new year gets far underway. Carriers last fall appealed for a 13 per cent increase and the Interstate Commerce Commission began hearings Nov. 30. The railroads asked for 8 per cent of this increase to be put into effect as relief during the period required for the ICC to study the over-all petition. The railroads contend, on the basis of the present outlook, that they will be unable to earn a rate of return of 3 per cent on net investment without a further rate adjustment; with the proposed increase a rate of return this year of 5.45 per cent is possible.

Last July a new order made permanent interim increases which became effective, with certain modifications, on Oct. 13, 1947, Jan. 5 and Jan. 13, 1948, and May 6, 1948. It provided increases averaging 22.6 per cent in answer to appeals for 29.2 per cent. Freight rates currently in effect are 44 per cent higher than those of June 30, 1946.

By W. J. CAMPBELL
Associate Editor, STEEL

LABOR'S NEW

ORGANIZED labor today is reveling in the greatest power it ever has enjoyed—politically, economically and organizationally. It has influence. It is articulate. It has a program.

The November election of a Democratic president and Congress was a victory for labor. The unions went all out for Mr. Truman in an aggressive campaign and were one of the decisive factors in the election. The administration's platform largely parallels the program of the unions. During the next 4 years, labor leaders expect to advise and counsel both the administration and the Congress on matters pertaining not only to wages, hours and working conditions, but also on such matters as public housing, price control, materials allocation and rationing, taxes and even foreign relations. Labor's influence in Washington may be greater during the months ahead than at any time during the Roosevelt administration.

Economically, the labor movement is in a strong position. Union coffers are well filled. Whatever monies are needed for political or organizational purposes can be collected from the membership without great difficulty.

Three postwar wage increases have been won by the unions and the probabilities are strong that further advantages will be wrested in the fourth round campaign this spring, either in direct wages or in welfare programs.

Organizationally, the labor movement is healthy. Internal friction, although still present, is less violent than in years past. Communistic elements are being purged. The two large federations are toying with olive branches. While merger is not in prospect, political collaboration is a fact.

How Big?—Union membership today is about 15.5 million workers, or about one out of four of the total working force. The movement is made up of about 200 national and international unions. One hundred and five of these are affiliated with the American Federation of Labor. Thirty-nine are affiliated with the Congress of Industrial Organizations. The remaining 50 to 60 unions are independents. Outstanding among these unaffiliated unions are the railroad brotherhoods, the miners, machinists, and several organizations of telephone and government workers.

Of the total membership of 15.5 million, about 7 million are affiliated with the AFL, 6 million with the CIO and 2.5 million are in independent unions. Since the depression low of the early 1930s, union membership has quintupled. The period of greatest growth was from 1935 to 1945 when membership increased from about 4 million to 15 million, under the aegis of the Wagner Act and strongly pro-labor Roosevelt administration.

Many large industries are practically 100 per cent organized. Such basic industries as steel, coal mining, commercial and home construction, transportation are covered by collective bargaining agreements. At the other end of the scale, comparatively few workers on farms, in offices and in trade are organized.

What Now?—The rapid growth of organized labor during the decade following passage of the Wagner Act was slowed down in 1946 when the voters rebelled against abuses and excesses by the unions and elected a Congress with a clear mandate to curb the unions' power. Followed the Taft-Hartley Act which was immediately and totally attacked by the unions as a "slave" labor law and was used as a rallying point to crystallize labor sentiment against the Republican-dominated 80th Congress. Outright repeal was demanded by the unions. This demand was incorporated in the 1948 platform of the Democratic party and major unions went down the line for Mr. Truman and his party.

First order of business of the unions now is to wipe the Taft-Hartley Act from the statute books and revive the old Wagner Act. Whether or not this will be as easy as the administration and the labor leaders believe remains to be seen. Although the 81st Congress is to be Democrat-dominated, each house in the new Congress contains a majority of members who voted for or are on record for the Taft-Hartley Act.

Modifications Expected—Actually, many labor leaders do not expect that the new Congress will go along with them all the way. They already are thinking in terms of a modified labor-management relations act.

But the program that will be presented to Congress will call for:

1. Repeal of Taft-Hartley Act.
2. Re-enactment of the Wagner Act.
3. Provision for later amendments and modifications.

Secretary of Labor Maurice J. Tobin called upon leaders of the major unions late in December to reach an accord on fair changes in the law. The administration wants and labor apparently is agreed on the inclusion of the following:

1. A procedure for handling national emergency disputes without strikes, possibly patterned after the railway labor act.

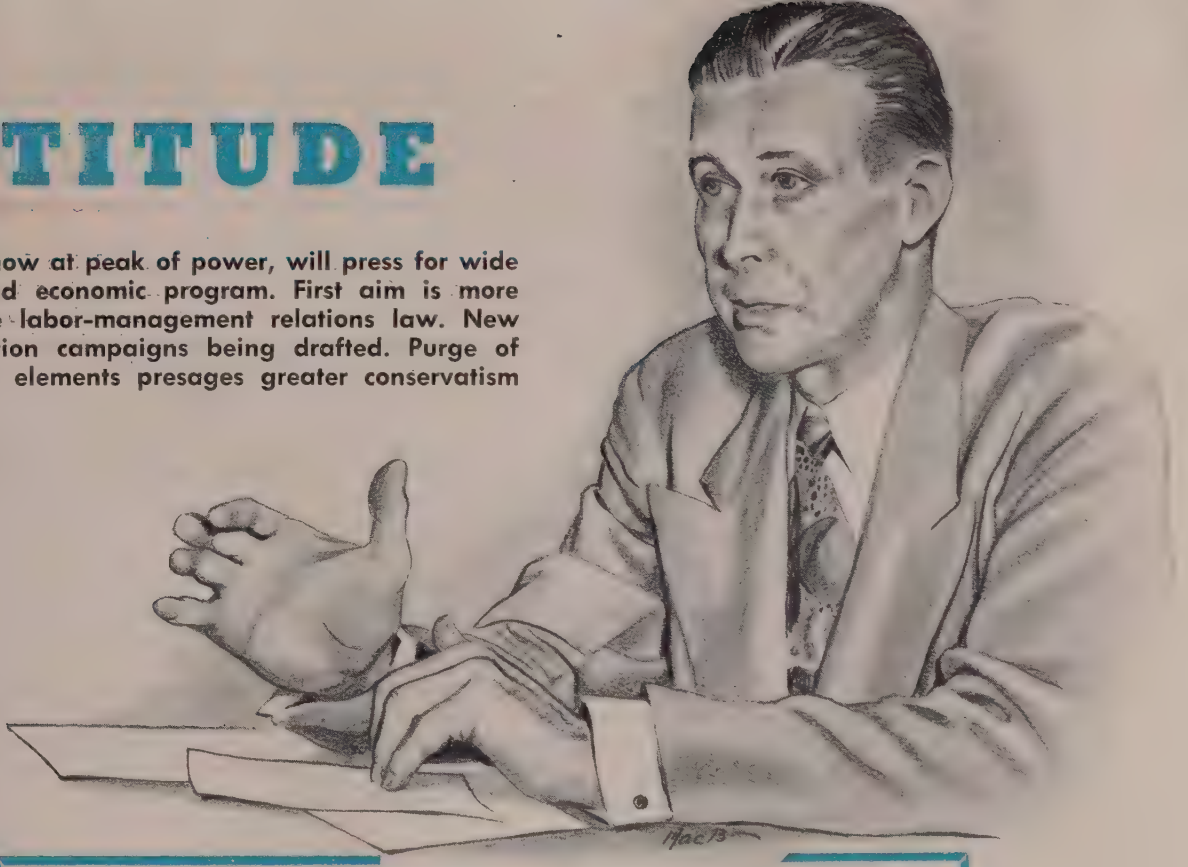
2. Provision for settlement of jurisdictional disputes between unions without work stoppages.

3. Prohibition of secondary boycotts. Unionists however, contend they should not be required to handle work of a firm whose employees are on strike or to handle work of a company which employs labor under substandard conditions.

4. Free speech for employers as long as there is no coercion.

TTITUDE

nions, now at peak of power, will press for wide ›cial and economic program. First aim is more ıvorable labor-management relations law. New rganization campaigns being drafted. Purge of ·ft-wing elements presages greater conservatism



MAURICE J. TOBIN took a long political gamble last August when he accepted what then looked like a 5-month job as secretary of labor in exchange for a good chance of regaining the governor's chair in Massachusetts. During 90 days, he made 150 speeches in behalf of President Truman, was one of the Chief Executive's most effective campaigners. Today Mr. Tobin is one of the most powerful and secure public officials in Washington. Under his leadership the Department of Labor is expected to assume an importance far above that of recent years. A staunch friend of organized labor and a firm opponent of the Taft-Hartley Act, he is of a character that will not hesitate to tell labor where to get off should its demands become unreasonable or excessive.

5. Non-Communist affidavits from both labor eaders and employers.

The unions will balk at inclusion of antistrike court ıjunctions such as provided in the Taft-Hartley law.

The CIO and the AFL are not in agreement on ome provisions to be included in the new law. The AFL, for example, wants specific provisions to permit raft elections in industrial plants. The CIO wants raftsmen included in factory-wide industrial units.

Labor's Program—In addition to a new labor-management relations law the unions have a comprehensive program of social and economic reform which hey want translated into action. Some differences re noted in the programs of the various unions, but ı the main they are in agreement among themselves nd with the administration.

The CIO wants price control and price rollbacks. AFL leaders are cool toward price control.

Rationing and allocation of scarce materials are dvocated by the CIO.

Federal support of farm prices is upheld by the nions, who want the farmers as political allies.

Excess profits tax and a levy on undistributed earnings are urged for corporations, while larger income tax exemptions, up to $3000, are asked for individuals.

Higher Minimum Wage—Major unions are agitating for an increase in the minimum wage from the present 40 cents an hour to $1 an hour, thus exceeding the administration's recommendation for raising the minimum wage to 75 cents.

Labor is making a double-barrel drive for additional social security. First, they want expansion of government social security to provide larger benefits and wider coverage. They also will seek additional social security from industry over the collective bargaining table.

Government-financed low-cost housing, a pet plan of Mr. Truman and other administration leaders, is enthusiastically backed by the unions.

Labor leaders also favor government participation in the expansion of industry, especially in such basic fields as steel and electric power.

Seek State Action, Too—While principal interest focusses on what the unions will attempt to wrest in

the way of federal legislation, a drive will be made to influence legislation in the various states as well.

At the time of the public rebellion against labor's excesses in 1946, a number of states passed laws restricting the unions, outlawing the closed shop, providing for waiting periods before strikes and otherwise curbing what the unions consider their prerogatives.

Now the unions plan to capitalize on last November's election results to force repeal of state laws which they consider unfavorable and to obtain more favorable legislation.

Better workmen's compensation laws, state wage-hour laws setting minimum wages, stronger child labor laws, better state labor departments, and improved safety regulations will be primary aims in the various states.

Fourth Round Wage Demands—All the big unions have gone on record for fourth round wage increases this year, although the enthusiam for money wage increases has subsided somewhat in favor of increasing real wages. Labor has become a little weary of the wage-price spiral and is coming around to a recognition that more dollars in the pay envelope do not necessarily mean more purchasing power. Despite three substantial postwar increases, real weekly wages are lower than at the end of the war (see chart). The issue in 1949 will be buying power of wages rather than dollars and cents rates.

Greater emphasis will be placed on welfare and social security demands in 1949.

Organization—Riding its crest of power, the unions will embark on new organization campaigns. This problem was the subject of much discussion at both the CIO and the AFL conventions in November. The growth of the unions has been very slow since 1946, a fact blamed by the unions on the Taft-Hartley Act which they say created an anti-union sentiment.

Now the organizers are getting set for new membership drives. The campaigns will be directed both into those industries where a large number of workers already are organized but in which some large unit are not, and into the fields of trade, office and servic workers where little headway has yet been made i organization.

A new drive to organize supervisory employees als is being planned. Both AFL and CIO may authoriz new unions for foremen.

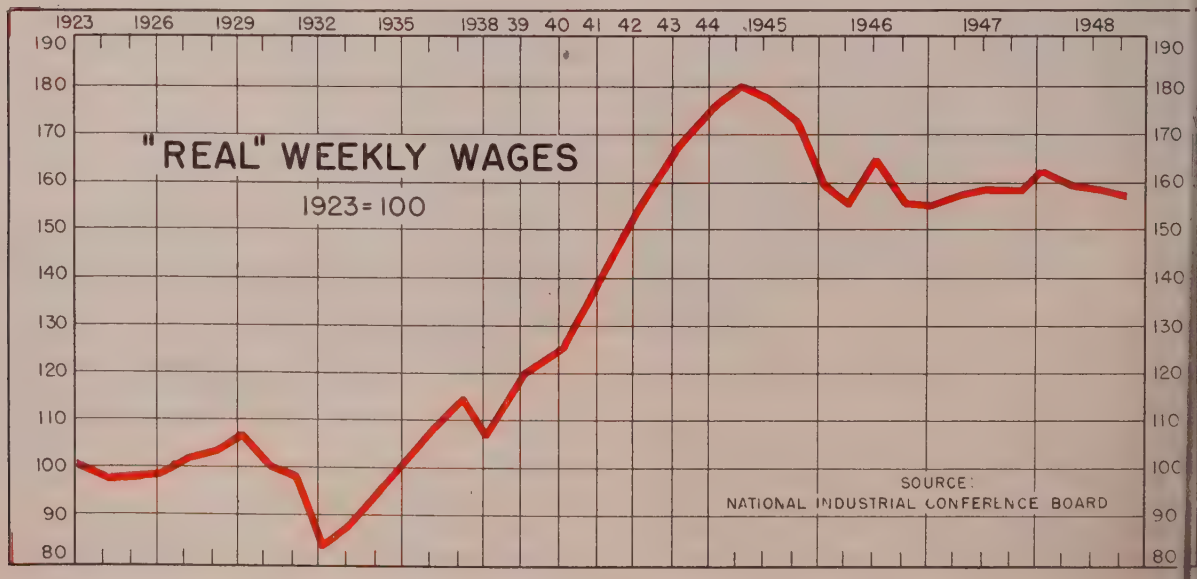
Purge of Communists—One of the healthiest de velopments in the labor movement is the apparen determination of the top leadership to purge th organization of communistic leadership. Sentimen at the national conventions of both large federation was overwhelmingly anti-red.

The CIO particularly has been plagued by the in filtration of reds into positions of top leadership i some of the member unions, and conflict betwee the left and right wing elements has caused consider able internal friction.

During the fall political campaign the left winger bolted the CIO to support Henry Wallace, and th chasm between left and right was widened. Sinc the election, President Philip Murray and other righ wing leaders of the CIO have taken off the kid glove in handling the leftist elements. The charter of th leftist Greater New York Council was lifted. Com munist-dominated unions which have had little suc cess in organizing their fields are being dropped b the CIO, which is sending right-wing unions in t organize these fields.

Will Power Bring Conservatism—The records o the conventions of the two major labor federation indicate labor leaders may develop a new sense o responsibility as result of their increased powe Notably lacking are militant utterances and fis shaking common in early days of the organization

Although much of labor's program is socialisti many students of the labor movement expect th unions to grow more conservative. They expect labor new power will again prove the old adage that th easiest way to convert a radical into a conservative to give him two shirts.



ndustry in PRICING DILEMMA

Ban on basing point and similar pricing in favor of f.o.b. selling threatens widespread economic dislocations. Solution of problem held dependent on legislation definitely legalizing freight absorption

By WILLIAM M. ROONEY
News & Market Editor, STEEL

INDUSTRY enters the new year in a pricing dilemma without parallel in the nation's history. After months of debate, interpretations, explanations, analyses, surveys and congressional hearings, not even a whole array of Philadelphia lawyers can answer the problem confronting businessmen as result of Federal Trade Commission rulings and court decisions adversely affecting traditional pricing practices.

The fog of uncertainty which descended over legal pricing that day last April when the U. S. Supreme Court handed down its now famous decision in the Cement Case has since thickened and spread to envelop virtually the entire economy, and worried businessmen ponder an economic philosophy which, many think, threatens a return to the horse-and-buggy commerce of days long since gone.

Impact Breath-taking—Impact of the decision on business appears breath-taking in scope. Lowell B. Mason, vice chairman, Federal Trade Commission, and lone dissenter on that body in its approach to the pricing problem, recently said that with the broad interpretation of the Robinson-Patman Act by the FTC and the Supreme Court the shadow of illegality falls over the pricing practices of thousands of manufacturing firms, while those of thousands of wholesalers are of doubtful legality.

Whether the impact of the decision will be as severe as envisioned by Commissioner Mason is yet to be determined. However, corporation counsel, almost without exception, interpret the Court's ruling as placing in jeopardy all systematic uniform delivered prices, freight equalization, freight absorption, zone pricing and the so-called basing point method in the sale of products of any and every description, from pins to massive machinery.

Take Issue with Position — Government counsel take issue with this position, holding only conspiracy and discrimination in pricing are banned; that individual sellers have complete freedom of action in using any pricing system so long as they do not act illegally and in concert. However, the uncertainty as to whether the FTC views identical prices as collusive whether they result from conspiracy or competition, has given rise to wide acceptance of the opinion all pricing methods where freight absorption figures in the determination of delivered prices are suspect, and that f.o.b. mill pricing is the only method that can be used with complete assurance of legality.

For more than 25 years the FTC has vigorously opposed various phases of delivered pricing. On three occasions Congress has rejected proposed legislation to outlaw basing point systems despite prodding by influential congressmen and the Trade Commission. Nevertheless, the FTC has continued its campaign and in 1948 achieved singular success for its efforts when the Supreme Court and Circuit Court of Appeals affirmed its cease and desist orders in the Cement and Rigid Steel Conduit cases.

Various Statutes Apply—The campaign of the FTC has been pressed under statutes aimed at eliminating price discrimination and unfair competition. Legality is measured by provisions of the Sherman Act, which

Senate Trade Policies Committee in session. Left to right: William Simon, general counsel; Sen. Brien McMahon; Sen. Albert W. Hawkes; Sen. Homer E. Capehart, chairman; Dr. Melvin T. Copeland, chairman of advisory council. Seated behind Dr. Copeland, left to right: William Bowles; Frank Schattschneider, assistant counsel; William B. VanHorne Jr., assistant general counsel.

outlaws conspiracies in restraint of trade, including price fixing; the Federal Trade Commission Act, which prohibits unfair competition; and the Robinson-Patman amendment to the Clayton Act, which outlaws price discrimination.

In the Cement decision, the nub of the current pricing question, freight absorption, was not specifically ruled upon. However, the Court held identical delivered prices, which resulted from freight absorption, indicated collusion in violation of section 5 of the Federal Trade Commission Act. It also maintained basing point pricing in cement was collusive discrimination against buyers in violation of section 2 of the Clayton Act as amended by the Robinson-Patman amendment. In other words, the different net returns to the mills on sales, due to freight absorption depending on distance of consumer from producing plant, amounted to discrimination in that sales to nearby customers netted the mills more than did sales to distant buyers.

Steel Basing Point Abandoned—On the face of this interpretation of mill sales prices, quoting of competitive prices through freight absorption would seem definitely out. At any rate, acting on this assumption, the steel industry, which had used a multiple basing point system since 1924, and prior to that a single basing point method (Pittsburgh Plus), last July abandoned its traditional pricing practice and went to straight f.o.b. mill pricing.

The repercussions were immediate and sensational. Almost over night the basing point question received nation-wide attention with steel consumers at all points of the compass suddenly realizing the import of the pricing change to their raw material supply and cost positions. In no time at all a congressional investigation was under way under sponsorship of Sen. Homer E. Capehart (Rep., Ind.).

Import Impossible To Assess—Full economic import of adoption of f.o.b. pricing is impossible to assess at present because of abnormal conditions. Only a few industries have effected the switch to date, steel being the outstanding instance. In this industry thorough analysis of the implications is complicated by unusual marketing conditions attending the postwar boom.

In recent weeks the question has been raised whether the steelmakers would return to basing point pricing should it be made definitely legal by Congress. Steel producers' net return under f.o.b. pricing is substantially increased over that under the basing point system. Some observers estimate passing along of freight charges to buyers nets the mills at least an average of $1 per ton more on sales. However, the freight advantage varies between the several producers and the numerous products affected.

In the present scarcity market many producers are inclined to restrict sales to home markets so long as demand from such areas is sufficient to keep plant facilities fully engaged. However, return of normal supply-demand conditions undoubtedly would change this position quickly.

Step Viewed as Backward—As a general thing the steelmakers view abandonment of basing point pricing as a backward step. They have maintained right

along that f.o.b. pricing will encourage local monopolies in the sale of steel; localize steel production and marketing; restrict competition between producers on a national scale; force the closing and relocation of some steel mills and fabricating plants as constricted markets give rise to excess local producing capacity; limit low-cost production and distribution; deny consumers free choice of suppliers; lead to geographical concentration of industry; cost customers more money because of increased transportation charges; prevent establishment of consumer cost estimates prior to purchases; result in higher prices on finished products; create confusion in marketing with chaotic effects on the whole economy.

Whether all these fears will be confirmed only time will determine. Effects of the change, however, already have been reflected to some extent in significant developments. The most immediate reaction has been confusion in prices. Listings by the various producers show different mill prices on many products, though the variations are not as numerous nor as extreme as had been expected. Delivered prices are all over the map.

Migration of Plants Indicated — Then, also, there has been some evidence that the new pricing policy will force fabricating plants distant from steel production points to migrate to centers more favorably positioned in relation to steel supply.

Several fabricating companies have announced plans for establishing plants in the Pittsburgh area which might result in transfer of activity from present locations. Still, it is anyone's guess whether wholesale migration of manufacturing plants is in the cards.

From experience to date under f.o.b. pricing it is apparent the change has more severely hit the steel consumer than the producer, and the single plant operation has been more seriously affected than the larger companies with branch plants and warehouses strategically located throughout the nation.

Not only have steel costs risen, in the majority of cases, because buyers now must pay full freight

LEGEND

Mills	Max. annual capacities
●	Over 1 million tons
▲	500,000 to 1 million tons
■	250,000 to 500,000 tons
▼	under 250,000 tons

At left is map prepared by Chicago Association of Commerce & Industry showing areas within which principal mills producing hot-rolled sheets, if selling on equal f.o.b. mill prices, would, with present freight rates, have a delivered price advantage

"Ghost" towns are seen threatened as result of f.o.b. pricing. Above is scene in Watertown, N. Y., which may lose an important industry because of pricing change

charges, but also buyers are faced with the problem of possibly adjusting their own selling practices to conform with the Supreme Court decision. Further, the steel consumer distant from a steel supply source now is faced with loss of that supply contact and inability to effect new mill connections nearby, this latter, in part, being due to the sold-up condition of all sellers. Centralization, not decentralization of industry, in most industrialists' opinion, will be fostered under f.o.b. pricing.

Sees Decentralization—On the other side of the argument, however, Walter B. Wooden, associate general counsel of the FTC, and the man who has exerted the greatest influence in shaping the commission's overall viewpoint on pricing matters, maintains the Supreme Court's Cement decision will tend substantially to promote decentralization, both in ownership and in geographic location.

Practices Grew with Industry—In this connection legal authorities point out that in the early days of the nation most products were sold f.o.b. factory because limited transportation facilities confined trading to local markets. Since then, however, transportation, communication and finance have grown with the country, and uniform delivered pricing, zone pricing and freight absorption have evolved in marketing as a natural corollary of industrial expansion as many companies attained national distribution of their products.

The steel industry, for example, expanded in the Pittsburgh district because of the easy availability of iron ore and coal. It was strategically located to serve a broad market. In time, the steel industry grew up elsewhere throughout the country so that today Pittsburgh has surplus steel capacity in relation to the confines of its freight advantage, or home market. Steel mills in the district will be adversely affected if their market is confined by freight charges to a circumscribed area.

Will Gains Offset Losses?—While it is conceded f.o.b. pricing will tend to eliminate wasteful cross-hauling, nevertheless, it is doubted the economic gains in this direction will be sufficient to offset obvious losses attending widespread dislocations believed certain to accompany any shift in steelmaking capacity.

Just what will emerge from the investigation by the Capehart committee is uncertain. Businessmen, however, are being advised not to be too hopeful of an early change in the antitrust laws; to prepare for any revisions which may be necessary in purchasing procedure and selling practices.

Members and staff attorneys of the FTC are of the opinion, in view of the November election results, there is unlikely to be any new legislation bearing on pricing methods. The commissioners and their attorneys have held right along no new laws are needed.

Political considerations will figure increasingly in the investigation should clarifying legislation be introduced. Rep. Wright Patman (Dem., Tex.), who will be chairman of the House Small Business Committee in the new Congress, has openly charged the Capehart Committee is trying to wreck the antitrust laws.

Issue Not Decided—The issue is far from decided. Representative Patman and other New Dealers may fail to prevent legislation clarifying the issue. Many congressmen are beginning to realize that all change is not necessarily progress; that all movement is not forward. Many are worried about threatened flight of industry to more favorable supply and distribution locations. Both Democrats and Republicans want to prevent thriving communities from being converted to "ghost" towns.

In such circumstances it seems evident some effort toward clarification of the issue will be made, if not through new legislation at least through a thorough exposition of the FTC's position on the question. Industry, it is felt, is entitled to nothing less, though it appears unlikely any curb on the powers of the FTC can be expected.

As things now stand, satisfactory solution of the problem rests with Congress.

Approximately one out of every two dollars the government spends goes for national security. Economic and industrial mobilization blueprints for future emergencies being drawn. Notable strides made in developing new weapons

DEFENSE ...What th doin

By E. C. KREUTZBERG
Washington Editor, STEEL

USING dollar expenditures as the barometer, defense now is the biggest single activity of the federal government. Approximately one out of every two dollars the government spends goes to build up our military security. What are we getting for this enormous outlay?

First, we are getting a first-rate planning job to put us in readiness for any emergency.

Second, we have created and are maintaining the nuclei of all the organizations for the next war.

Third, we have made rapid recovery from the disastrous "get-the-boys-home" era that followed close upon V-E Day and again have some military forces worthy of the name.

Fourth, we are making notable strides in developing prototypes of new weapons of offense and defense and already have many of them ready to be placed in mass production.

No Complaisance—None of the above statements should be construed as indicating any feeling of complaisance in any responsible quarter in the government with what we are doing. In Washington there are two points of view between which the government has to steer some sort of a middle course. One view is that, considering the threats to our security and the likelihood that the next war—if there is to be one—will dwarf our performance in World War II, we are not doing nearly enough. The other view is that, considering the defense burden in relation to its drains on our economy, we are doing altogether too much. The disposition is to hold down defense expenditures to the basis of existing conditions.

For example, the National Military Establishment has submitted three budget requests for the fiscal year ending June, 1950. One, designed to fall within the President's $15-billion limit, comes to $14.4 billions. The second calls for $15.5 billion and the third for $23 billion. Naturally, the armed services would like $23 billion in order to do all that can be done to promote our military preparedness. At the moment the administration favors asking Congress for the minimum amount—$14.4 billion, in the belief that conditions abroad are less threatening.

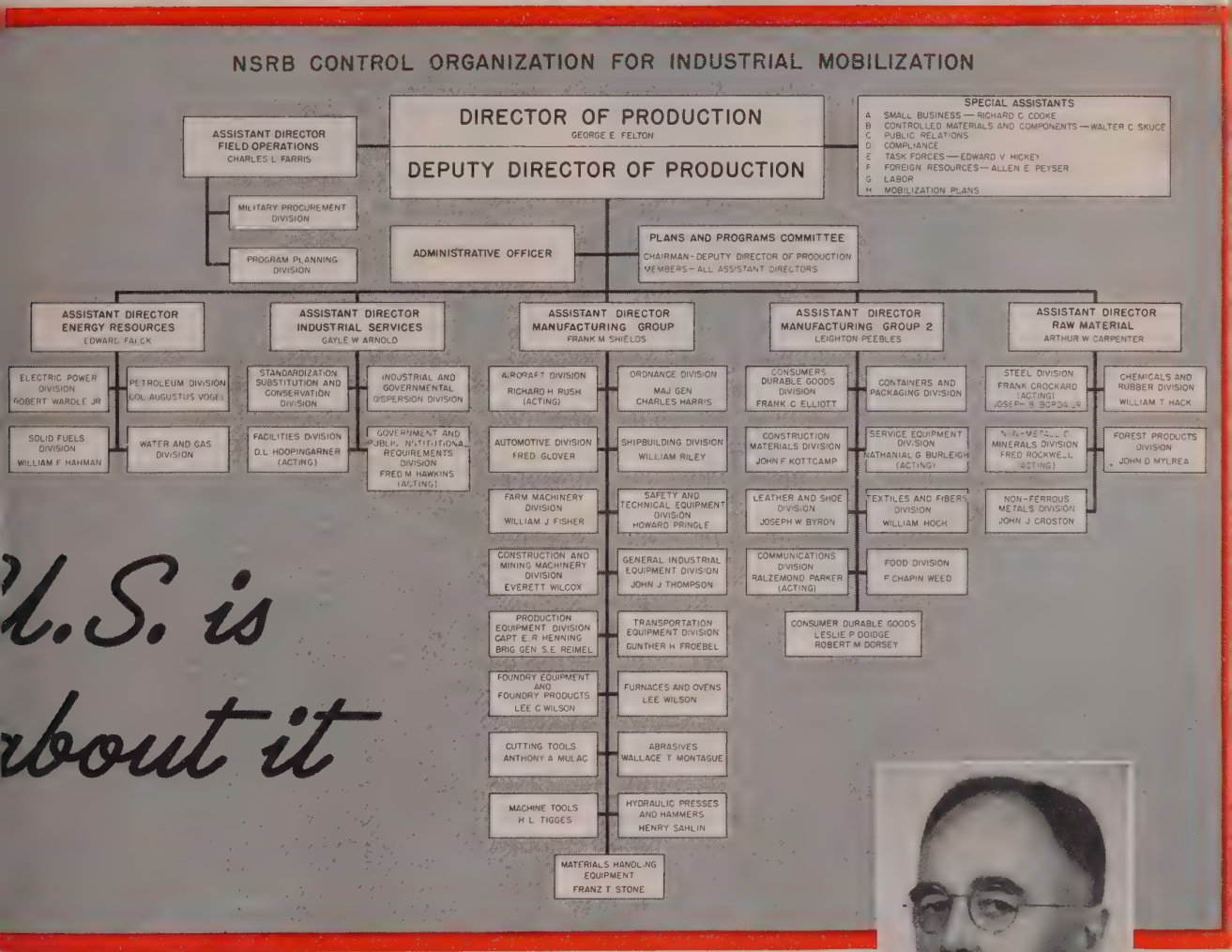
May Seek More Money—However, this is the attitude right now; the situation next week or next month may again take a turn for the worse, in which event the administration probably will ask Congress for more money. In fact, there is a strong likelihood that Congress in any event will receive some new requests in connection with our national security; fresh grants to help Europe to re-arm and possibly to help the Chinese in their war with the communists.

For those who like statistics, here is a partial breakdown of federal expenditures for defense and national security during the current fiscal year ending next June 30: National Military Establishment $13,815,694,000, Economic Recovery Administration $5,300,000,000, Atomic Energy Commission $630 million. But that is not nearly all; unfortunately the federal books are not kept to show the total national security expenditures. The National Advisory Committee for Aeronautics, the Federal Works Agency, the War Assets Administration, the Maritime Commission, Reconstruction Finance Corp. and such departments as State, Commerce, Agriculture and Interior all pay out large sum for national security.

Security Budget Immense—So it is a guess, but a fairly accurate one on the whole, that of the $42.5 billion the federal government is spending in this current fiscal year about half goes to national security. And this breakdown should not be construed as including costs of past wars which we now are paying. Parenthetically it may be stated that of our $42.5-billion budget for fiscal 1949 approximately 80 per cent is being spent for past, present and future national security.

Money Not Wasted—In further answering the question as to what values we are deriving from our enormous outlay for national security, it must be pointed out that a great deal of the money is far from wasted. The belief of the average citizen that most of it is a waste is unfounded. Actually we do get real values. First and foremost, of course, the fact that the defense machine we are building up has impressed the Russians, who have a great respect for power. Another value is the part these expenditures play in propping the economy.

One of the biggest values, however, is that as a by-product of these expenditures we are buying rap-



U.S. is

bout it

George E. Felton
NSRB Director of Production

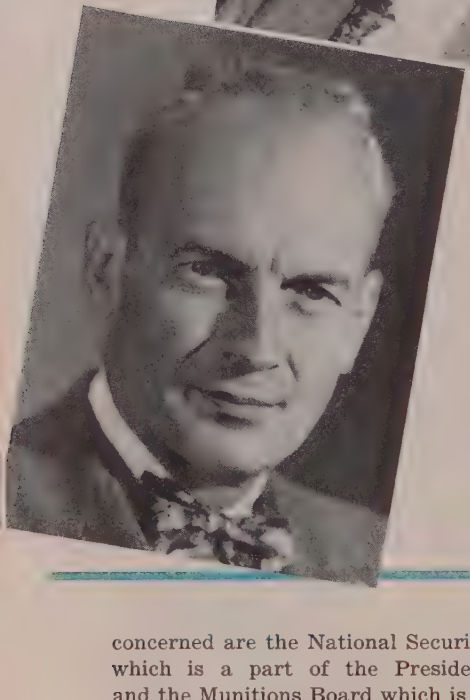
progress in the whole field of science and development. New inventions and discoveries are aiding not only the military program, but they are stepping up our plane of civilian living.

Radioactive tracers are a new tool in the field of metallurgy. Great advances have been made and continue to be made in the field of medicine. The same is true in the field of nutrition and food processing. Improved new textile fabrics have been developed and a new more economical method of assembling garments with plastic cement instead of the conventional thread is at hand. New lubricants with everlasting life permit manufacture of many mechanical assemblies with permanent sealed-in lubrication. We know how to get along with reduced consumption of critical and strategic materials through the use of more plentiful substitutes. Tremendous accomplishments have been made in the development of air navigation.

Take one development alone—the new electronic digital computer of which the armed services have 600,000 on order. This instrument performs complex mathematical computations with the speed of light and can be used for many purposes; new applications are being developed continuously.

Two Key Setups—In the National Defense setup the two key organizations as far as industry is

E. T. Grether
NSRB Director of Economic Management



Shown above is John R. Steelman, acting chairman of the National Security Resources Board

Shown at left is Donald F. Carpenter, chairman of the Munitions Board

concerned are the National Security Resources Board, which is a part of the President's advisory staff, and the Munitions Board which is under the Secretary of Defense. Many hundreds of manufacturers already have conferred with these organizations.

As a result of this co-operation, the NSRB has been able to set up a revised mobilization blueprint which seems to provide for all mobilization needs and for all preparatory steps necessary at this time.

All this planning work continues to go on intensively. As an example, the NSRB is working with manufacturers in a study of the Military Industrial Reserve and the National Industrial Reserve which include 555 plants of various kinds and some 160,000 machine tools and allied equipment items. The purpose is to get the answers to such questions as: What are the deficiencies in our industrial reserve and what steps should be taken to remedy them? In what types of equipment is there excess capacity, and in what types is the existing capacity insufficient to support an emergency?

All this work is in addition to that the armed services themselves are doing to pave the way for procurement on an unprecedented scale. As manufacturers well know, the armed forces are studying productive facilities of some 14,000 prime contractors, not counting many thousands of subcontractors.

Stockpiling 51 Materials—Among problems discussed with the industry committees are those incidental to the stockpiling program. This is costing around $600 million annually at the present rate but procurement for stockpiling is held back by the fact that production of many strategic and critical materials is only capable of meeting present record peacetime demands. However, some headway has been made in opening up new sources, by the device of ordering for future delivery to stockpiles. At present 51 materials are on the stockpiling list, while 32 others are listed as strategic and critical.

"Push-Button" Warfare—Weapons for waging so-called "push-button" warfare are not yet ready for production lines but arsenals and laboratories are working day and night on development of new and better weapons which eventually will be ready for industry's production lines, if and when the need arises.

What weapons will industry be called on to manufacture in volume in another war? As of the moment, they will be pretty largely the weapons of World War II or improvements over these. Important new weapons include recoilless guns which, in 75 and 57-millimeter sizes, now may be fired from the shoulder. General Patton's widow on Nov. 11 christened the first operational model of the new General Patton tank which has greater flexibility, maneuverability and firing power than World War II tanks.

Better Jet Engines—The new fighter planes have gone over to jet power in which some amazing improvements will be forthcoming before too long, providing both higher speeds and longer range. Water-cooled turbine blades permitting higher operating temperatures; after-burners; new fuels and improved fuselage designs are helping to place the U.S. out in front. Government research on internal combustion aircraft engines has been dropped but these types still are favored for cargo and troop carrying, as well as for long-range bombing. A new wind tunnel now going into service permits research on aircraft and guided missiles at speeds up to 1500 mph.

Higher aircraft speeds have evolved new aircraft armament problems which now are being worked on. In the news recently, have been aerial "torpedoes" which are supposedly effective at 20 to 30 miles and which eventually may outmode the familiar World War II 90 mm anti-aircraft gun.

In future wars, the Navy may depend to a large extent upon rocket carriers with their tremendous firepower, and less on battleships, and its submarines may be driven at high speeds under water for long distances by peroxide powered engines.

Keep Informed—To keep informed as to what the individually can do to advance the cause of national security, manufacturers should keep in touch with their trade or industry associations; generally such association executives are in close touch with the national security picture.

In addition there are 10 industry associations with which the armed services have continuous liaison and which are relied on for help in the solution of all sorts of problems.

THE IRON ORE SHORTAGE

Real or Fancied?

Recently much has been written regarding the dilemma facing steelmakers due to threatened exhaustion of the Mesabi iron ore reserves. From an analytical perusal of factors involved in the national iron ore scene, it does not appear too likely that steelmakers will be wanting for good quality ore at anytime in the foreseeable future

By DAN REEBEL
Associate Editor, STEEL

IS IRON ORE starvation for the nation's blast furnaces just around the corner? Will improved beneficiation methods for the leaner ore and stepped-up exploration and development of new ore bodies offset the loss in Mesabi production in ensuing years?

The experts disagree on these questions so vital to the national economy and security. Exhaustion of the readily shippable Mesabi product in the next few decades is seen by some. Nevertheless, there is an enormous tonnage of low grade ores in this area which remains to be exploited.

While it is impossible to measure the real extent of untapped deposits in the Lake Superior region, geologists estimate the quantity of ore remaining in this area at 1,200,000,000 gross tons. On this basis, the source which supplies approximately 82 per cent of the nation's requirements could conceivably be exhausted within two decades by continued high iron and steel production.

High Consumption Rate—Average annual ore production during the last 8 years has been at a rate of 80 million tons or more. Steel production from 1940 to date has made tremendous inroads upon principal ore supply—that of the Lake Superior district—and the Mesabi range open pits, in particular. For example, Lake Superior shipments during 1948 were roughly 83 million gross tons as compared to 77,981,000 for 1947. Ore stockpiles at steel plants and on docks totaled 38,500,000 gross tons at the end of the past year.

Incorrect appraisal of figures concerned with Lake Superior ore reserves, prepared by state tax departments, together with the recent rate of production from these reserves, has given rise to the rumors which paint such a gloomy picture of the United States iron ore situation.

Reserves of open pit ores are reported at about 50 per cent of the total, whereas production from these pits normally supplies more than 75 per cent of Lake Superior shipments. Thus, it appears the indicated life of the open pit reserves is far less than 15 years.

Not True Measure—Tonnages of estimated taxable reserves subject to yearly revision are not a true measure of the total recoverable ores, and they cannot be used as indications of the total ore which the district may produce after the date to which they apply. Mining experts believe that while there is no thought that the record of additions to reserves for the past 30 years can be duplicated in the future, it is certain the total amount of ore of present commercial grade yet to be recovered in the Lake Superior ranges far exceeds the tonnages currently on the tax records. Figures reveal that over the past 32 years, for each 3 tons of ore removed from known reserves, over 2 tons were added; and during the past 7 years nearly 2 tons were replaced for each 3 tons removed.

More than one-fourth of all ore shipped from the Lake Superior district since its discovery in 1844

was removed during the last 8 years. As the result of this tremendous output, many authorities think our days of self-sufficiency in ore are numbered.

Improved Methods Help — Improved methods of mining, concentrating and beneficiating the leaner ores seem to be, up to the present, one of the chief factors for offsetting steadily growing deficiency of the high grade ores.

Principal sources of American ore outside the Lake Superior district are Alabama, Georgia, Missouri and Texas; the eastern districts of New York, New Jersey and Pennsylvania; and the western districts of Wyoming, Utah and California. In recent years approximately 85 per cent of our total ore output has come from the Lake Superior district, 9 per cent from the southern, 3 per cent from the eastern, and 3 per cent from the western.

Less than 3 million tons annually were imported in 1945 and 1946 from Canada, Sweden, South America, Cuba and Africa. Imports during 1947 were close to 5 million tons and will be about 5,750,000 in 1948.

New Facilities—To offset the dwindling supply of high grade ore, the steel industry's postwar expansion and improvement program incorporates plans for development of additional reserves and construction of ore processing facilities. One objective is utilization of lower grade (taconite) deposits. The Lake Superior region contains an abundance of iron-bearing taconite rock. It was from this rock that the richer ores were formed ages ago as natural forces gradually removed the silicon from the taconite.

Research is aimed at duplicating the results of this geological process and recovering a usable product. Extensive research and experimentation on the technology of this operation and upon the agglomeration of the concentrate in a form suitable for blast furnace use now is underway at the Mine Experiment Station, Minneapolis, and in a co-operative program at Battelle Memorial Institute, Columbus, O.

Laboratories for research in concentrates of the leaner ores have been built or are under construction

EXPORTS AND IMPORTS OF IRON ORE
(Gross Tons)

	1948	1947	1946	1945	1944
Exports	2,900,000 est.	2,817,211	1,505,854	2,063,125	2,417,789
Imports	5,750,000 est.	4,893,176	2,812,916	1,189,300	463,715
	1943	**1942**	**1941**	**1940**	**1939**
Exports	2,720,845	2,515,388	1,907,612	1,336,304	1,057,304
Imports	402,096	731,325	2,343,983	2,479,326	2,412,515

by Oliver Iron Mining Co., Pickands, Mather & Co., Cleveland-Cliffs Iron Co., Jones & Laughlin Steel Corp., M. A. Hanna Co. and Minerals Separation Co., subsidiary of International Minerals Corp. In addition to the above installations, a new plant for production of commercial iron powders is being operated by Continental Machine Co. at Aurora, Minn.

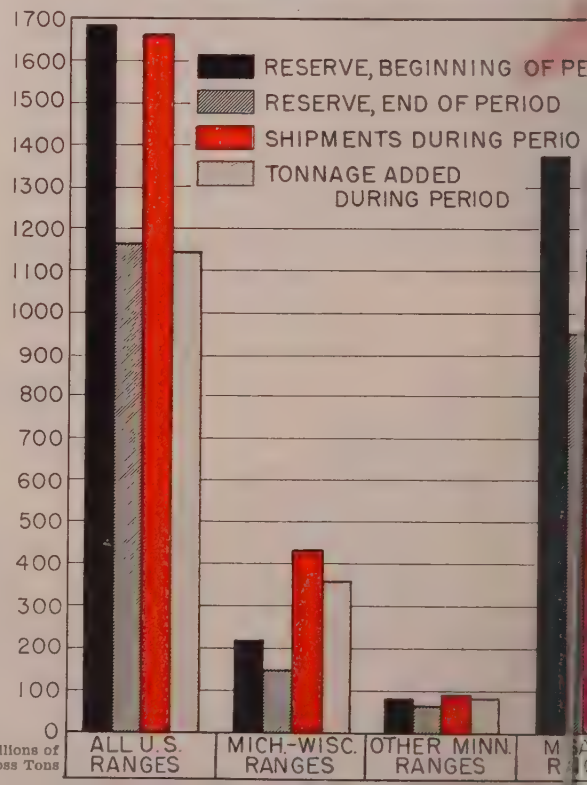
Three For One — About 3 tons of taconite rock must be quarried and processed to get a ton of ore that can be used in the blast furnace. The material must be crushed and powdered, and the iron then extracted by magnetic or flotation methods. United States Steel Corp. recently estimated it will take over one-half billion dollars in plants to produce 50 million tons of taconite concentrate annually. Th is a ratio in excess of $10 in original plant investmer for every ton produced annually. Some experts b lieve it will require from 6 to 10 years to achieve a annual taconite production of 10 million tons.

Progress is being made in finding better ways t separate the iron from the silicon and other impur ties. The first pilot plant, built by Pickands, Mathe & Co., was recently placed in operation on the Mesal range at a cost of $2 million for production of usable product from magnetic taconite. Results c this plant's operation are expected to provide th basis for construction of a commercial plant man times its size. Many other concentration plants ar planned. The magnetic taconite product will exceed 6 per cent iron content and being free from moisture wi effect savings in freight and in smelting costs.

New Ore Bodies—Discovery of new ore bodies suc as the Quebec-Labrador field is most important. Ex tension of known ore bodies by mining and develop ment work laterally or vertically beyond the limit taken into account each year in estimated reserve are also significant. Changes in mining technolog and equipment, ore dressing and in new improve blast furnace practice play a leading role in addin to our reserves.

Regarding future discoveries in the Lake Superio district, intensive geological and magnetic surveys, in cluding those by aerial magnetometer together wit a tremendous drilling program now going on, seer certain to uncover significant finds of ore. Substantia new ore sources in the Lake Superior region hav been uncovered by recent exploration and develop ment at Michipicoten and Steel Rock lake in Ontari

32 Years, 1915-1945 Inclusive



Significant Developments—Other technological research is turning up significant developments. One of these is a new type of drilling rig developed by Union Carbide & Carbon Corp. which utilizes the process referred to as "jet-piercing." This new tool, it is reported, can perform the drilling operation 8 to 10 times faster than with the old type churn drill.

Utilization of low grade magnetite deposits in the New York Adirondack region is lessening the pressure upon Lake Superior ores somewhat. Present output is mostly utilized in furnaces which also use Lake Superior ores. Constant exploration and development is being carried out in this area by Republic Steel Corp., Jones & Laughlin Steel Corp. and the M. A. Hanna Co., who expect it will play a greatly extended role in future iron ore supply.

Exploration and development of the Labrador-Quebec ore field by Hollinger Consolidated Gold Mines Ltd. and M. A. Hanna Co. is of great import at present as recent reports indicate the past season's field work will probably bring proven tonnage to a figure likely to justify the large expenditures estimated at from $250 to $300 million necessary to bring it into production. Drilling to date has proved approximately 150 million tons of ore.

Little Drilling Needed—Ore from this area seems similar to that from the Mesabi range. Little drilling and blasting is required to loosen the ore analyzing iron plus manganese at 62.7 per cent, phosphorous .101 per cent, sulphur 0.008 per cent and silica 4 to per cent. Officials expect this area can be operated or 6 months a year.

When will actual production start? Firms in the field won't definitely state but some experts close to the project figure within 5 years. Present plans call for hauling out 10 million tons a year at first and then eventually working up to 20 million tons.

Development of the St. Lawrence Seaway would be helpful in getting these ores to the Great Lakes, and some qualified observers see the waterway and Canadian ore as a necessary combination in order to maintain and expand American industry.

Mined Beneath Ocean—Newfoundland ores do not offer an adequate solution to present American furnace requirements, being too high in phosphorous and silica. They have to be mined underground, far beneath the Atlantic ocean and possibilities of greatly expanding production appear distinctly limited.

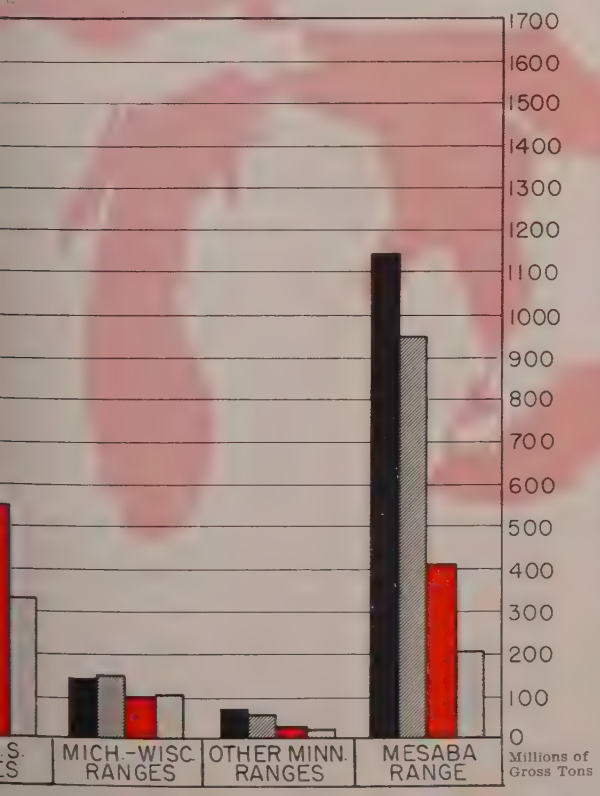
The vast iron ore resources of Brazil, a very high grade product easily mined by open pit methods, has long been looked to as a potential source of supply. However, being 4000 miles away, the problem of developing costly transportation facilities overland to the Brazilian sea coast together with ocean transportation for very long hauls seems to remove them from consideration.

Venezuela has large deposits, some now being developed by Bethlehem Steel Co. These ores could be moved into the Lakes region with less transportation than those from Brazil. Present exploitation appears directed toward moving the ore to our Eastern seaboard. It could possibly find its way west by rail to furnaces, especially in western Pennsylvania.

Extent to which ores from Chile, Sweden, Africa, Cuba may affect the future of steelmaking, depends upon the extent of the advantage in cost and marketing of increasing amounts of steel made in eastern and southern plants. Iron and steel production in Alabama is dependent mostly on the low grade ores which are used because of their convenient location with respect to fuel and flux. Two war-built blast furnaces in Texas use mainly local ores supplemented in part by ores from Mexico. Hemitite ores and concentrates from Missouri supply furnaces at Granite City, Ill., which also use some Lake Superior ores. Abundant reserves of a 35 per cent hemitite ore are found in Alabama which runs about 0.3 per cent in phosphorous. Experts believe southern ores will be adequate to sustain the industry in that region almost indefinitely. However, they are no substitute for Lake Superior ores used by the lower lakes steel plants, and it is not believed they will ever constitute an alternative source of supply.

Western Ores—Western steel plants in Colorado, Utah and California receive their ore primarily from Wyoming, Utah and California. These western ore reserves seem adequate and undoubtedly will take care of any considerable expansion of the western steelmakers for a long time to come. Any plant expansion occurring in the east, south and west will undoubtedly utilize ores which are accessible to their area whether imported or domestic and iron produced there will partly relieve the pressure for enlarged outputs from the lower lakes steel plants.

7 Years, 1940-1946 Inclusive



Relationship of mine shipments to depletion of taxable reserves of Lake Superior iron ores. Reserve tonnages are as reported by state tax commissions.

Scrap Situation

Steel mills have comfortable inventories for current needs but U. S. industry now faces task of helping establish reserve stockpile for use in case of an emergency

IMPROVING supplies and stabilizing prices may be indications that the iron and steel scrap situation, frequently at a boil during and since the war, is cooling to a fairly steady simmer.

Despite an alltime record consumption of an estimated 29 million gross tons of purchased scrap in 1948 and an anticipated consumption of only slightly less than this amount in 1949, steel mills and foundries are looking forward to a less volatile market this year. As a basis for their hopes, scrap consumers point to the heavy collections and surprisingly steady prices during the closing months of 1948.

As of last Sept. 1, consumers' stocks totaled 3,561,000 gross tons compared with 3,406,000 tons in stockpiles on Dec. 31, 1940, highest recorded since statistics were first compiled in 1939. Prices, although now double OPA quotations, have varied only moderately in the past few months.

Situation More Normal—Explanations for the new outlook in scrap lie in a gradual trend toward more normal economic conditions, anticipated favorable results from the scrap drive, imports of about 100,000 tons a month from Germany and possibly some from Japan.

While visible scrap supplies appear to be comfortable today, these could melt away in a few short weeks should the nation face a sudden emergency. Therefore, the government, through the Office of Industry Cooperation of the Department of Co merce, is asking industry to dig out all obsolete m chinery and materials to set up a 3 million-t emergency stockpile.

Cycle Regains Momentum—The situation in scr at the end of World War II was something like that a bicyclist who, after traveling for some time ov rough roads, finally loses his balance. The prewa more or less routine cycle of scrap generation a resale to mills and foundries first began to wob after the heavy exports to Japan and Europe d ing the late thirties. The war's interruption to civ ian output and consequent loss of scrap norma generated in this way, together with the untold to nages of potential scrap lost in war materiel, se the cycle weaving dangerously. The return civilian production and the beginnings of a scr flow engendered from this output have smooth the road considerably, and the cycle is again off a shaky, but promising start.

Concrete proof that the cycle is again worki say many scrap consumers, is the rising metalwo ing production which parallels the rising purcha scrap generation and consumption. In the past th years, metalworking output has increased stead but this has been matched by rising scrap generat and consumption — 20,435,000 gross tons in 19 26,055,000 in 1947 and 29 million in 1948.

'ess Acute

By J. C. SULLIVAN
Pittsburgh Editor, STEEL

Deals and Trades Fading—The gathering speed and omentum of the cycle is leaving behind some of e deals—scrap for new steel and scrap bought r conversion—which were typical of the immediate stwar years and which accounted for many of e price gyrations. From the beginning of 1947 rough July, 1948, the composite scrap price exeded that of pig iron, a unique reversal in their ual price relationship.

This situation has righted itself, and now there is chance that scrap prices may ease, particularly e cast grades. Increased wages and freight rates re a possible offsetting factor this year. There re ruts in the road ahead, also, which might throw erything out of balance again. Another war or harply mounting defense needs could overthrow the licate balance. A government sponsored program steel facility expansion would complicate matters.

Another factor contributing towards optimism about rap is the more moderate activity among foundries. any foundries now are looking for business for e first time since before the war. While the overl demand for scrap is not going to be appreciably wered by this slackening, the slightly easier pres-ure for the commodity, always acutely sensitive icewise to any economic shifts, will be welcomed by l consumers.

Scrap Imports Rise—Opinion is mixed regarding e importance of scrap imports. About 350,000 tons ere imported in 1948, or only a little more than per cent of total purchased scrap consumed. In 947 scrap imports amounted to only 32,312 tons, hile the war peak was 128,018 tons in 1943. During e closing months of 1948, German scrap shipments this country ranged between 50,000 and 60,000 tons onthly. An agreement has finally been worked out ith the British on this thorny problem so that the . S. in the coming months will get about 100,000 ns a month, and total U. S. imports should easily ceed in 1949 the 1948 import total.

Although these figures are small compared with e total U. S. consumption, they take on a greater portance when compared with prewar imports. In 939, this country imported only 29,432 tons, but xported 3,577,427, chiefly to Great Britain, Italy nd Japan. The changed export-import status with apan was emphasized recently when Secretary of ommerce Charles Sawyer revealed that Japan's supies will be surveyed to determine how much can be rought back here.

Immediate effect of rising scrap imports has already een felt as far west as Pittsburgh where some arnegie-Illinois Steel Corp. mills have received German shipments. European scrap will probably get no farther west than this, but chain reactions resulting from less dependence of eastern mills on domestic sources will be felt all over the country. Incidentally, before the war, Europe had to import about 1.5 million tons of scrap yearly, most of it from the U. S.

Scrap and Technological Advances—It is still uncertain what effect an anticipated increase in pig iron production for the coming year will have on the steelmaking melt ratio in 1949. If high top pressure techniques for blast furnaces and improved methods for improving the grade of coal can bring about any significant increase in pig iron production, the scrap ratio may go down. Several major integrated steel producers last year used up to a 35-65 per cent scrap to pig iron ratio in the production of ingots.

Total scrap consumption for 1948—home and purchased—is estimated at 57.5 million gross tons, compared with 52.2 million gross tons of pig iron used. Corresponding figures for 1947 were 54.1 million and 52.2 million; for 1946, 43.4 million and 39.9 million; for 1943, 55 million and 53.8 million; for 1939, 32.4 million and 31.5 million. Scrap and pig iron percentage ratios are as follows: 1948, 52.4 to 47.6; 1947, 52.1 to 47.9; 1946, 51.5 to 48.5; 1943, 50.6 to 49.4; 1939, 50.8 to 49.2.

Another factor which may in the future ease the steel industry's reliance on scrap is the greater utilization of heavy sinter. Expansion of sintering facilities is under consideration in the industry.

Successful reclamation of scrap from slag dumps and general refuse areas increased during 1948, and will probably continue at the same rate in 1949. Many independent operators have mechanized considerably since the war, and this, together with high scrap prices, has made the business profitable. Reworking of one slag dump in the Pittsburgh region nets 5000 tons of high grade scrap monthly.

Shipbreaking Operations Fall—Sources for scrap which are certain to become of less and less importance during the coming year are shipbreaking and government scrap. Scrap from shipbreaking averaged about 50,000 tons per month during 1948, in contrast to an average of about 80,000 monthly in 1947. Continuation of this downward trend is likely during 1949. Similarly, scrap originating from government war agencies has declined in recent months and probably will continue to do so.

In 1948 steel mills could afford to be more particular about scrap quality than at any time since before the war. As a result, scrap quality went up last year, a trend which may be accelerated during 1949. Purchase of remote scrap was also reduced.

EVOLUTION in

New processes bringing production practice to threshold of new era. Progress made in use of oxygen and higher air pressures in furnaces. Continuous casting of steel to semifinished form and larger capacity blast furnaces studied

WHILE users of steel are concentrating on t capabilities of the nation's steelmaking faci ties to keep pace with demand, changes a quietly but surely making themselves felt steelmaking processes. Working as steadily as t bubbling molten metal in the furnaces, these forces evolution are slowly bringing steelmaking practice the threshold of a new era.

Some observers already feel steelmaking develo ment is reaching the point where processing will be matter of tapping furnaces, and immediately conver ing the molten metal into useable shapes—by-passi the ingot mold, soaking pit and blooming mill.

That day is not yet here, but new and improv methods of steel production are making themselv felt. Whether in the form of "harnessed" oxygen higher air pressures, or whether in the form of co tinuous casting or larger and more efficient facilitie they are steadily increasing steel output and qualit

Important Development—Perhaps most importa of the developments on the iron and steel indust horizon is the imminent realization of a blast furna capable of producing 2000 tons of pig iron every hours. Already being actively discussed by ironma ers, the 2000-ton blast furnace stands a good chan of being considered a "standard" facility shortly.

Looking at this oncoming furnace a little closer a widely discussed subject in steel circles today brings up an incident that should change the coun nance of the most expert furnaceman. It had to with a statement made in the late 20's by James West Jr. He dared to predict that the 1000-ton bla furnace was feasible and within grasp of the indust

Today, the 2000-ton blast furnace is under cons eration and no one dares belittle the idea. How c they in face of the fact a stack in the Pittsburgh d trict with a 28½-ft hearth already has cast 1910 to in a 24-hour period, establishing a new world reco

Who in the days of the old stone furnace could have anticipated a stack capable of casting over 1900 tons of iron a day? Yet this was accomplished by one modern furnace to establish a new world record last year

By J. D. KNOX
Steel Plant Editor, STEEL

Steelmaking

Many blast furnacemen believe the next decade may
e a 30-ft hearth diameter furnace burdened with
e best beneficiated iron ore, a good grade of sinter,
d charged with a fast-burning coke, produce 2000
ns or more of iron in a 24-hour period.

Stack Lining—Some consideration is being given to
plication of carbon for stack lining based on im-
ovement afforded by this refractory in hearths.
Present day blast furnace practice indicates use of
carbon lined hearth does not affect heat economy
the furnace to any serious extent. On blowins
ter banking, it has been found that the absence of
sizable salamander contributes to saving of fuel re-
ired to bring the furnace back up to heat. Experi-
ce also discloses that the entire hearth lining of
rbon or fire clay is preferable to partial lining of
her.

Use of its recently developed high top pressure
ast furnace blowing technique was extended to 5
ditional furnaces last year by the Republic Steel
rp., Cleveland. These included installations at fur-
ces in Warren, O., Buffalo, South Chicago, Ill., and
o additional stacks at Youngstown, O. The com-
ny thereby gained the equivalent of the output of
e additional blast furnace. Greater than normal
lume of air under this new technique enters the
yeres at the bottom of the furnace while a throttle
lve at the top restricts waste gas escapement, thus
ilding up a gas pressure within the furnace and
owing down the velocity at which the gas passes
rough the shaft.

Ignition Device—Blast furnace men view with inter-
t a new oscillating ignition device now being used
r sintering lead concentrates at a saving in fuel
nsumption of about 40 per cent. Thorough tests
ve been made throughout the year just closed of
ening blast furnace tap holes by means of a pro-
ctile-shaped unit about 1 ft long and 2 in. diameter
ntaining about 2 oz of an explosive and known as a
t caster.

New Scale Cars—One of the recent advances made
stockhouse scale cars at blast furnaces is the de-
gning of the scales so that the main knife edges and
earings are enclosed in a steel housing which is part
the scale levers themselves. This construction af-
rds protection and at the same time all parts are
sily accessible for inspection.

Modern tendency is toward use of a double-com-
artment car, and cars of lighter capacity. Several
the newest furnaces are using cars of 40 tons ca-
acity, largest blast furnace scale cars yet built.

An interesting application also has been made of transfer cars equipped with self-contained diesel electric power. Air-operated trash cars also are finding wider use around iron and steel plants because of simplicity of operation.

Oxygen Use Gaining—Use of oxygen in blast furnace practice is gaining momentum. Operations have started in a plant constructed for the production of low purity oxygen for use in hot blast at the Bethlehem Steel Co.'s Johnstown, Pa. plant. Oxygen enrichment of the blast is expected to speed the rate of smelting.

At Weirton Steel Co. output of present steelmaking facilities is expected to be increased about 20 per cent by the operation of its $4 million oxygen plant with a capacity of about 400 tons. The blast furnace now producing 1000 tons every 24 hours is expected to cast 1200 tons when blown with oxygen enriched air. At the open-hearth plant, a furnace normally producing 400 tons of steel per day is expected to have its output increased 100 tons per day.

Arrangements have been completed by the Wheeling Steel Corp. to install a large, low-purity oxygen plant at its Steubenville, O. division. The new plant is to be designed for 135 tons of oxygen per day for use chiefly in the open-hearth.

Oxygen In Bessemer—Experimental application of oxygen in the bessemer converter used at Weirton's plant for producing blown metal for final refining in open-hearth furnaces indicates that additional scrap up to 20 per cent above normal may be charged.

Information to date indicates that the use of oxygen in the open hearth fuel burner is of greater advantage for an open-hearth practice using high scrap charges as compared with one using a high iron charge. In the case of a 200-ton open hearth, use of about 600 cfm of oxygen during the scrap melting period (approximately 4 hr) should produce an increase in open-hearth furnace production of about 40 per cent with a 10 to 15 per cent decrease in fuel consumption.

Oxygen also is finding wider use in electric furnace practice. In the manufacture of stainless steel, its use affords higher percentage of stainless scrap that can be charged, a high percentage of chromium recovery, a decrease in consumption of kilowatt hours per ton of metal, an increase in the output, lower material handling costs, and less off-quality heats of straight chromium grades.

Basic brick continues to be an interesting point of conversation among open-hearth operators. At one

plant where the furnaces are equipped with basic ends and silica main roofs it has been found that repair time has been decreased and production increased from 5 to 7 per cent. Increased production also has afforded reduction in fixed costs of about 5c a ton.

As brought out by one metallurgist, slag control is paramount in economical open-hearth operation. Open-hearth practice shows that amounts of fluxing agent are important in controlling the degree of basicity of open-hearth slag. If the basicity is increased by increasing the slag volume, rate of production of an open-hearth furnace is greatly reduced.

Easy removal of slag deposits after cooling is made possible by the development of a graphite base brick. Operation with this refractory discloses that in most instances the slag which forms is considerably less than under normal conditions.

Building Open Hearths—For many years Jones & Laughlin Steel Corp. at its Pittsburgh works has relied heavily on bessemer and duplex steelmaking practices. Last year, however, construction was started on six new open-hearth furnaces which will have an annual capacity of 780,000 tons and will replace 10 small, obsolete units. Completion of this modern open-hearth shop will permit the company to lean more heavily on scrap and hot metal practice.

Development of a duplexing operation whereby high-frequency induction melting and arc furnace melting is combined has permitted economic utilization of high percentages of stainless steel scrap in the melting of low-carbon, high-quality, chrome-nickel stainless steel at one Pennsylvania plant.

Continuous Casting—A continuous casting process developed jointly by Republic Steel Corp. and Babcock & Wilcox Co., has produced many tons of electric furnace steel, both carbon and alloy grades which

Pouring a heat of open-hearth steel. Skill is required in opening and closing the ladle nozzle if the heat is to by-pass the scarfer's bench

were converted into slabs and oval billets at th Beaver Falls, Pa. plant of the latter company.

In the rolling mill industry a new mill under e perimentation is capable of producing from 3 to 1 times that obtained from an almost duplicate a pull Steckel mill. Reduction approaching those usua ly considered normal with low-carbon steel has bee made on 18-8 stainless, 3.3 per cent silicon steel an 1.25 per cent carbon steel. Over 35 per cent redu tion per pass has been made on soft stainless, silico and carbon steels, and over 50 per cent on low carbo

A 50-ton Rohn cluster type mill, which was ob tained by the Navy Bureau of Ordnance as reparatio from Germany, is being installed at the plant of th Allegheny Ludlum Steel Corp. at Brackenridge, P The mill, designed for production of thin strip equipped with 20 rolls.

New 5-Stand Tandem Mill—One of the most ad vanced 5-stand tandem mills for producing cold r duced strip in tin plate gages and widths was place in commercial operation last year at Aliquippa, P Each 15-ton, hot-rolled coil almost 6 miles long rolled under controlled tension and pressure cond tions in about 5 minutes. Higher speeds actuall have been obtained. The mill can be accelerate to 4500 ft per minute in only 6 seconds.

Development of a new flying shear drive also wa an achievement in the year just closed. In it a singl motor direct-connected to the bottom knife elim inates all gearing except that between the upper an lower shear knives. The shear can be accelerated t the proper speed in about ¾-second. Similarly it ca be stopped in about the same time. A saw for cut ting skelp in transit at 1000 ft per minute is also new development.

Flash Trimmer—Another recent development is flash trimmer of the rotary type. Removing flas down to the level of a lighter gage strip, it require accurate stopping of the strip in the trimming pos tion. The unit is being further developed for tin plat gages. Development of the past year also includes new machine for the production of ozone which wi be used in pickling.

The first hot strip mill to operate on a commerci basis in the Philadelphia district will become an a tuality sometime this year when the Alan Wood Ste Co., Conshohocken, Pa., applies power to its 30-i hot strip mill with annual capacity of 218,000 net ton

Alan Wood is an example of a steelmaker enga ing in stripmaking for the first time. In another i stance a manufacturer of strip steel in the Detro area is entering primary steelmaking for the first tim Faced with likelihood of being cut off from semifi ished sources, the McLouth Steel Co., Detroit, pu chased from the War Assets Administration an ele tric furnace ingot plant built for the government Indiana Harbor, Ind. When completed, it will cons of four 60-ton electric arc furnaces with combin capacity of 30,000 tons of steel ingots a month.

Steel demand-supply balance not in immediate prospect, but lowered activity of some consumers, high ingot output and steel industry's rising capacities suggest stringency in some products may ease

The Steel Shortage — How long?

By VANCE BELL
Associate Editor, STEEL
and
JOHN S. MORGAN
Assistant Editor, STEEL

APPROACH of a new year always is accompanied by considerable speculation as to business and economic prospects. Sometimes there is little reason for any more crystal-gazing then than at some other time of year, other than arrival of a new year is by custom considered a milestone from which to check on the course of the future.

However, events appearing rather suddenly at the turn of the year give steel producers and consumers especial reason for trying at this time to appraise what 1949 has in store as to balancing of steel demand with supply.

All through 1948, demand ran far ahead of supply and during most of the year it was generally agreed that the date of a balance of demand and supply was a considerable distance away. But in December, as steel ingot production hit 100 per cent of capacity and new alltime records, some consumers of steel, notably appliance manufacturers, began reducing their output. Could this be considered a sign that the postwar boom was over and that demand for steel would weaken in 1949? That question was in a lot of minds.

Producers Alerted—Although they are on the alert for any abrupt change in the demand pattern, steel company executives foresee no immediate drop of consequence. However, some of them do believe some products will be more nearly in demand-supply balance in 1949 than in 1948.

In anticipating continued strength in demand, steel companies recognize that civilian needs accumulated during the war have not been completely filled, the population of the United States has increased 12½ per cent in the last decade, and the increased standard of living requires larger amounts of steel. An example of the latter is motor vehicle registrations in the United States. In 1948, passenger automobile registrations totaled around 31 million, compared with 26,140,000 in 1939 and 20,586,000 in 1933. To build a popular postwar auto, 200 lb more steel is used than during the late prewar period and up to 1000 lb more than in the early 1930s.

The appliance lines which late in 1948 began to show signs of weakening are relatively light tonnage consumers of steel. Of the estimated 66 million net tons of finished steel produced in 1948 only about 1,680,000 tons or 2.6 per cent went to producers of such appliances as cooking stoves, refrigerators, washers and ironers. Although production cutbacks in these fields were not accompanied immediately by any substantial reduction in orders for steel any decline would be of minor consequence in comparison with the current overall steel demand. A modest easing in orders from these fields would be welcomed by steel companies for the bulk of the tonnage used by these consumers is flat-rolled products, the tightest of all in supply.

Strong Outlook—Meanwhile, the outlook was strong for the automotive industry and the construction industry, the two biggest consumers of steel, their receipts last year aggregating approximately 25 per cent of all finished steel. Predictions toward the year-end were that automobile output in 1949 would approximate that of 1948, second largest annual production in history. One auto producer recently reported that even after deducting the unsure orders from its backlogs it has enough business to assure 18 months' output.

During 1948, the auto industry received an estimated 10,090,000 net tons of finished steel, or approximately 15 per cent of the year's production.

The construction industry, including maintenance, received last year an estimated 7¼ million net tons, or 11 per cent of all finished steel produced. Approximately a fourth of this went to nonresidential construction and a fourth to the oil and gas industry. Suggesting a continued strong demand for nonresidential construction, a joint report of the Commerce Department and the Securities & Exchange Commission says that if spending lives up to business plans, outlays on new industrial buildings and machines in the first quarter of 1949 will total $4.4 billion, a record dollar volume for the first 3 months of any year

and not far below the $5 billion expenditure which in the last quarter of 1948 set a record as the highest amount for any quarter in history. However, some allowance must be made in the 1949 first-quarter figure for inflation.

Plan Huge Spending—The other big factor in construction, expansion of oil and gas production and marketing facilities, continues with undiminished strength. The oil and gas industries have announced they plan to spend a record total of more than $10 billion between now and 1952 to expand their facilities. Just recently the Federal Power Commission said the insufficiency of steel is the main cause of delay in construction of pipelines to meet the rapidly growing demands for natural gas. A survey, the commission said, shows 83 natural gas companies received commission authorization to build $1,158,640,-164 of new facilities between Feb. 7, 1942, and Aug. 31, 1948. Of the 377 projects authorized, 89 were still under construction as of Aug. 31 and 48 had been delayed. Of the delays, 38 were attributed to inability to obtain pipe and the other ten to delay in obtaining other steel equipment.

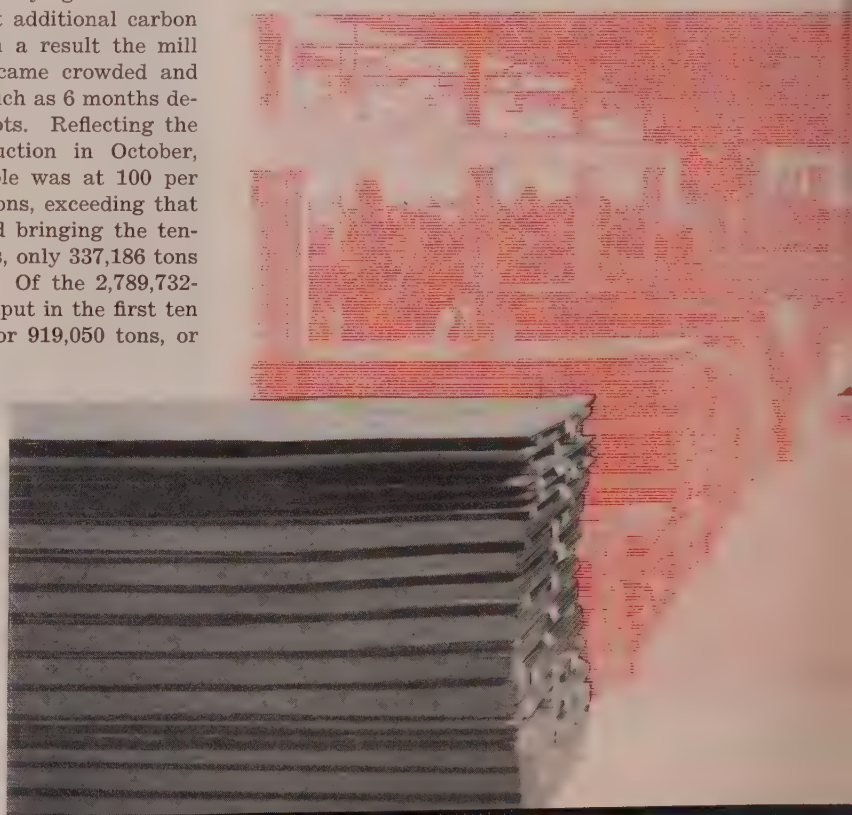
Rail transportation, ranking in 1948 among the four largest users of steel by taking about 8 per cent of the year's output, should also continue to require substantial tonnages in 1949, for freight car builders, consumers of around half of all steel going to the rail transportation classification, have order backlogs that would require a year to work off at the current monthly average production rate of around 9300 cars.

With demand for carbon steel far ahead of supply in 1948 many consumers were hampered at various times in maintaining steady operations. In an effort to overcome this handicap they in many instances switched to the use of alloy steels and aluminum as substitutes. On top of this, war jitters in the late summer sent many consumers scurrying to bolster their steel supplies. Unable to get additional carbon steel they took alloy instead, with a result the mill order books for alloys quickly became crowded and deliveries became extended to as much as 6 months despite a heavy turnout of alloy ingots. Reflecting the heavy demand, alloy ingot production in October, when steel ingot output as a whole was at 100 per cent of capacity, was 781,906 net tons, exceeding that of any previous month in 1948 and bringing the ten-months' aggregate to 7,008,341 tons, only 337,186 tons less than produced in all of 1947. Of the 2,789,732-ton increase in total steel ingot output in the first ten months of 1948, alloy accounted for 919,050 tons, or one-third.

No Room for Increase—With steel producing operations at 100 per cent of capacity near the yearend there was no room for additional increases in alloy output, so this product could not offer further relief as a substitute. Dependence on aluminum must be limited too, for demand for that product in 1948 was estimated at about 500 million lb in excess of supplies despite record peacetime output. Expecting this imbalance to continue, one aluminum producer reduced allocations to its customers for the early months of 1949.

The excess of demand over supply has kept pressure alive both from industry and government for continuance of special allocations of steel to certain industries. While some of the old voluntary allocations programs will be continued for perhaps as long as Sept. 1, the setting up of any new ones depends on the wishes of the new Congress. What it chooses to do likely will be influenced considerably by the economic and business outlook the first of the year. At the year end, Commerce Department officials believed the need for allocations had diminished somewhat. Several months ago they estimated the finished steel shortage in 1949 at 10 million tons, but at the turn of the year they had reduced their estimates to 5 to 6 million tons.

Seek More Capacity—Nevertheless, there still persisted the demand from some quarters for legislation to raise capacity of the steel industry, and one veteran senator was hoping to get Congress to pass such a bill. However, the steel industry maintains that such legislation is not needed. It points out that ingot capacity as of Jan. 1, 1948, was 3 million tons greater than on Jan. 1, 1947, and that expansion projects still underway will increase it further. Since the war, the steel industry has authorized improvement and expansion programs involving more than $2 billion, with



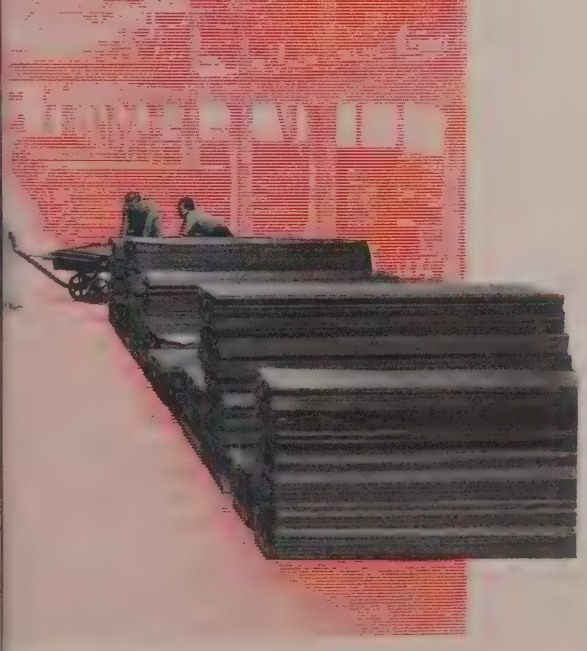
Experiencing heavy demand not only from regular warehouse customers but from other consumers who ordinarily would depend only on mills, warehouses are turning stocks over rapidly. At right is scene in a typical warehouse

expenditures up to now estimated at more than $1.5 billion. Last year these well exceeded $600 million for a new postwar record, compared with $500 million in 1947 when new investment in steel plant exceeded net profits by around $53 million. It was estimated that new investment went ahead of net profits again in 1948.

The steel industry also points out it has increased ingot capacity 17½ per cent in the 10 years since 1938, while population of the continental United States rose only about 12½ per cent. In addition, blast furnace capacity has been pushed up 19 per cent, capacity for finishing hot-rolled steel products has risen 14 per cent, and hot-rolled sheet and strip capacity has climbed 35 per cent.

In view of demands for mandatory increase of steel capacities, one steel company president recently warned that too much pressure by the government for expansion could be disastrous for industry. Citing today's construction costs of from $250 to $300 per ton of ingot capacity, this executive contended that a forced and large expansion would necessitate a big increase in steel prices. When looking at such high construction costs, and cognizant that the break-even point in today's operations is exceptionally high, steel company executives remember there have been years when capacity was far in excess of needs. In 1938, for instance, only 39.6 per cent of the capacity was operated; in 1932, only 19½ per cent. And in those years, capacities were considerably less than that of today.

Outlook Bright—With expansion programs pushing the ingot capacity upward toward the alltime high set in 1945, and with scrap in improved supply, it would appear that the steel industry should be able to continue its operations at or near capacity, barring interference from labor troubles. If defense or war needs do not suddenly boost the demand for steel, the pressure for premium-priced steel, such as that obtained through conversion deals and the gray market, probably will continue to ease. At the end of 1948, it was reported the demand for gray market steel had declined. In one instance one lot of steel which had been offered on the gray market in August was still available in December. Although demand for ingots for conversion had eased a bit by the yearend it still exceeded supply. This pressure for carbon ingots prompted steel companies to put idle electric furnace capacity into production, with a result that electric furnace output in the first 10 months of the year totaled 4,072,423 net tons, compared with only 3,061,614 in the corresponding period of 1947. Of the 1,870,682-ton rise in carbon steel ingot output in the first 10 months of 1948, 41 per cent, or 767,133 tons, came from electric furnaces.



Because of the heavy demand for conversion ingots the furnaces of some of the country's steel foundries have been diverted to production of basic steel ingots.

Under conversion arrangements, a number of mills whose rolling capacity exceeds their ingot producing capacity have been taking in ingots and semifinished steel and rolling them into finished products.

To boost their supplies of steel, some consumers have been making outright purchases of steel producing and rolling facilities, thus restricting even further the tonnage available on the open market for the general consumer.

In other cases, some large consumers who ordinarily would obtain all their needed tonnage from mills are paying the higher warehouse prices to get supplementary steel when possible from warehouses. However, warehouses have had as much difficulty as other buyers in attempting to keep up their steel stocks.

Dependence Diminishing—Effect of foreign dependence on the United States for steel is problematical but it would appear that it will diminish inasmuch as steel output abroad is recovering. In November, the British steel industry attained a new high record in steel output after having set one in the previous month. In Western Germany steel ingot and pig iron output climbed to a postwar high in October. Belgium and Luxemburg also set steel production records that month.

With export controls in effect on steel in 1948, mill shipments of finished steel from the U. S. in the first nine months of the year aggregated only 2,425,002 net tons, compared with 3,075,903 tons in the corresponding period of 1947. Total mill exports in 1947 were 4,206,692 net tons.

There were indications, however, that European rehabilitation activity that would be reflected in demand for steel in the United States will increase. The Economic Cooperation Administration predicted recently that Marshall Plan nations will order an increasing amount of U. S. machinery and plant equipment in the coming months. European buying under the aid program, ECA said, has switched from food to industrial goods and this trend should accelerate as Europe's production lines gain momentum.

Stockpiling Aggravates NONFERROUS

SUPPLIES of nonferrous metals will continue extremely tight in 1949. This has been the prospect the beginning of each year since the end of the war and no fundamental change has occurred in market factors to change the outlook for the new year.

As a matter of fact, the supply problem for the next few years is described as overwhelming so far as copper, lead and zinc are concerned. Tin also is expected to remain on the critical list for several years, while aluminum will continue in heavy demand.

Although prices rose last year to the highest average level in history, market observers foresee no downward trend for at least six months, if then. Acceleration in the accumulation of strategic metal supplies for the government's permanent stockpile will more than absorb increased tonnages which may come on the market through increased production or any decline in consumption which might develop.

Supplies Inadequate — Domestic supplies of the three major nonferrous metals in recent years have been far below domestic demand, especially during the war period, and the prospect of regaining national self-sufficiency is not promising. Chiefly for this reason, the Bureau of Mines favors a national mineral policy fostering such supply through "political stabilization, financial and technologic support, and fair international trade conditions." Dependence on foreign supplies in times of emergency is the key to the government's stockpiling program.

Means are being sought to revitalize this program which is lagging far behind schedule. Toward the close of last year, government officials and metal producers drew up plans for voluntary allocations of metals to the stockpile. Proposals which likely will receive consideration early in the new year include those calling for re-enactment of the metal subsidy bill to permit the reopening of marginal mines; for increased effort toward encouraging exploration and development of new sources of essential materials.

Would Buy Surplus—"To provide incentive for the creation of new production facilities," a Bureau of Mines official says, "the United States could guarantee to buy all surplus production within stipulated limits as to quantity and maximum price for at least 10 years, and also establish minimum price that would give reasonable assurance of profitable production. Such a program would remove the uncertainty as to future markets that is now restraining mineral production and this should go far in stimulating the creative forces of industry all over the world. . . . It would release dollars that are badly needed abroad and facilitate redistribution of gold of which we now own such a disproportionate share."

The House Public Lands Subcommittee on Mines & Mining probably will ask for mine subsidy legislation in the next Congress. The staff of this subcommittee has outlined a program of inquiry into the stockpiling situation for the early months of the next session.

Proposes Hearings — The subcommittee also has outlined proposed hearings on domestic requirements and shortages of strategic metals to determine effects on the stockpile program and the mineral industry. The Stockpile Act of 1946 provides for the accumulation of stockpiles over a period of 5 years, starting with the fiscal year ending June 30, 1947, and with a total expenditure at current cost estimates of about $3.4 billion for the minimum amount necessary for national safety.

The Munitions Board has not announced the objectives toward which these accumulations are building. Moreover, progress in acquiring materials is not reported and the rates of acquisitions are contingent for the most part on future congressional appropriations. Nevertheless, strategic stockpile demand will absorb all copper, lead and zinc outputs above current normal demand for some years to come and will prevent the satisfying of consumer demand fully at least through 1949. Enough information has been released to give the public a general idea of the magnitude of the undertaking, although it is safe to assume that the June 30, 1949 goals are not to be considered as the ultimate ones.

Stockpiling Goals—Present plans call for withdrawal of 10,000 tons of copper per month through June for the government stockpile, or a total of 90,000 tons for the fourth quarter of 1948 and the first half of 1949. It calls for 51,000 tons of lead to complete the goal of 70,000 tons to June 30, 1949. Withdrawals of zinc for government account from known supplies have totaled over 263,000 tons during the last four years, including 55,946 tons during the first 11 months of 1948. The Munitions Board and the Office of Metals Reserve likely will hold not over 75,000 tons of tin by mid-1949 toward its goal of not less than 300,000 tons, the accumulation of which will require at least five years.

Consumers of tin in this country must reconcile themselves, therefore, to doing the best they can under the present rate of allocations through mid-1949 because no change in present restrictions for that period is contemplated. Any surpluses arising from the sizable increase in world production will be made available for stockpiling purchases. For the 15-month period ended Nov. 30, RFC's stocks of tin rose from 16,356 tons to 46,454 tons, an increase of 30,098 tons, or an average of 2007 tons a month. If world condi-

SHORTAGES

Copper, lead and zinc supply problem for next few years expected to be overwhelming. Power shortage creates tight situation in aluminum. Restrictions on tin use may be eased slightly in mid-1949

By F. R. BRIGGS
Associate Editor, STEEL

Stock being removed from storage for use at forging plant. Similar reserves of critical metals are being accumulated by government for use in emergencies

ions permit, the government may lessen tin controls ext summer and allow consumers another 10,000 tons year.

Imports of pig tin into the United States averaged bout 4000 tons a month in 1948, or about 80 per cent f the amount consumers have been allowed to use. roduction gains for the leading producing areas may e summarized as follows:

Total production of tin concentrates in the Netherands East Indies should exceed 32,000 tons in 1948 nd at the yearend was at the annual rate of 37,000 ons. Only in 1937, 1940 and 1941 did the NEI prouction exceed 37,000 tons.

Rehabilitation of the tin industry in Malaya coninued steadily last year and output for 1948 is esimated at about 45,000 tons, an increase of about 5,000 tons over 1947. In 1940 and 1941, production veraged about 80,000 tons. Mining experts believe Malaya could produce 100,000 tons a year, if given dequate machinery. Siam's production for 1948 is stimated at about 11,500 tons compared with only 401 tons in 1947.

Texas Output Up—Texas Longhorn smelter, proccssing principally Bolivian ores, increased production ast year to about 36,000 tons compared with 33,292 ons in 1947 and 43,468 tons in 1946.

Strikes in the lead, zinc and copper producing inustries curtailed output of these metals seriously ast year and were an important factor in the reduction in stocks. The strike at Kennecott Copper Corp.'s roperties in Utah, which started late in October, lowred total supplies of refined copper to only about 5,000 tons a month, or about 40 per cent short of onsumption. Stocks of slab zinc dropped to about 6,000 tons at the yearend compared with 68,011 tons t the close of 1946 and 259,391 tons at the end of 945. Although stocks of refined lead increased to around 24,000 tons by Dec. 31, 1948, from 21,787 tons a year earlier, they were less than one month's requirements.

The chief hindrance to operations in the aluminum industry was created by a power shortage, especially in the Northwest. Production jumped to around 625,000 net tons from 571,750 tons in 1947, but the increase was not sufficient to cover consumers' needs fully. Expanded uses and substitutions arising from shortages in other materials lifted domestic shipments to some 630,000 tons.

European Aid — Policies formulated by the new Congress covering international relations will determine to what extent the domestic mining industry will be called upon to aid in Europe's rehabilitation. It is clear, however, that a substantial part of foreign production will be channeled into this program which otherwise would be available to domestic consumers.

WEST Seeks Industrial Se

WITH new records chalked up on a dozen production fronts, western industry heads into 1949 confident its dynamic economy, more diversified and better-balanced than ever before, can take in stride whatever readjustment this year may bring.

Peak activity marks the West's steel, oil, rubber, automobile, petroleum equipment, furniture, and electrical appliance industries. In the 11 western states, population growth and increase of per capita income continue to lead the nation.

Nevertheless, western industrial leaders are level-headed in their optimism. They note return of competition in many consumer products, tapering off of public and private construction, and extended labor difficulties in western shipping, oil, and mining. These leaders call for increased efficiency in production, reduction of costs, more intensive development of natural resources, and promotion of additional basic industries.

Steel In Van—Since the war, the steel and metal-working industries have been pacing western development with their vigorous expansion. Steel capacity is nearing 5 million tons and includes facilities at Seattle, Portland, San Francisco, Pittsburg, Los Angeles, Torrance, Fontana, Calif., Geneva, Utah and Pueblo, Col.

Cognizant of the importance and size of this market and its potential for future growth, steel produc

Dynamic economy of 11 western states flexing its muscles as it enters 1949 more diversified and better balanced than ever before. Expansion potential tremendous with area still producing far less than needed

ufficiency

By BERT D. LYNN
Editorial Representative, STEEL

s are pushing plans for augmenting their western itput. U. S. Steel's expansion program for its Combia and Geneva subsidiaries runs to $130 million, new facilities completed or underway. Kaiser Steel ., Bethlehem Steel, and Pacific States Steel Corp., l are expanding, as are many small fabricators.

Completion last year of Columbia's new $25,000,-0 cold-rolled sheet and tin plate mill at Pittsburg arked addition of upwards of 325,000 tons of roll-g capacity. To supply Pittsburg with its raw ma-rials, Geneva Steel Co. has installed conversion fa-lities costing $18,600,000 for production of hot-lled coils.

Columbia has ordered an additional cold reduction eet mill at Torrance which will boost flat-rolled pacity another 325,000 tons annually.

Against a mountain backdrop at Fontana, Kaiser's eelworks is mushrooming. The Fontana mill recent-opened a vast nearby source of high-grade ore, is w constructing a second 1200-ton blast furnace and new 185-ton open hearth. Other expansions sched-ed for this year are an 86 in. hot strip mill, an ectric weld pipe mill, and 45 additional coke ovens.

Metals in Short Supply—Nonferrous metal produc-s in California, Utah, Arizona, and New Mexico in eneral had a good year in 1948. Lead and zinc were their highest levels in history. Copper drew good ices. Western consumers have been taking all the uminum and magnesium they could get. Demand is en, particularly from the aircraft, camera equip-ent, furniture, luggage, and kitchen appliance in-ustries.

It is recognized that as a market for metals and etalworking equipment the West has a tremendous ture potential. According to STEEL's latest census, alifornia has more than 2000 metalworking plants, 1/12th of the nation's total. While California in 39 ranked seventh in value of manufactured prod-cts, it is fifth today.

Population-wise the state ranks third, and there is tle doubt sprawling Los Angeles itself will cross million by 1950.

What this means to suppliers is indicated by the eady influx of eastern companies into the West. A major portion of the $70 million in new industrial facilities established in Los Angeles county last year was built or purchased by 32 nationally-known manufacturing firms new to Southern California.

Assembly of automobiles in the West has assumed major proportions, with virtually every leading maker establishing plants since the war. In 1940, Ford, Studebaker, Chrysler, Buick-Olds-Pontiac, and Willys had plants in the Los Angeles area, while Ford and Chevrolet were in northern California. In the last two years, Lincoln-Mercury Division of Ford has constructed a plant in East Los Angeles; Chevrolet has completed a plant in Van Nuys; Nash purchased facilities at El Segundo; Kaiser-Frazer leased a portion of a government-owned plant at Long Beach; and Chrysler is building a Dodge factory in Oakland.

In their best pre-war year, western auto plants assembled 154,000 cars, while in 1949 they will turn out about 700,000. Truck output also will be up.

Parts and Equipment—At the same time, parts and equipment suppliers are developing facilities and erecting plants to mass-produce the large volume of components western automobile plants now require. Both Ford and General Motors plan to spend $60 million annually for locally-produced parts. Ford's West Coast purchasing program has reached a current volume of $30 million a year.

Aircraft manufacturers on the Coast are being called upon to build about two-thirds of the planes ordered under the new 70-group air program. Western container and canning plants in most cases are operating at capacity. One-fifth of total U. S. consumption of tin plate is accounted for by the 11 western states. Construction set new records although toward close of the year heavy projects tapered steeply.

Continuing development of electric power resources in Washington and Oregon will enable future expansion of industry in the Pacific Northwest area. Since 1940 electric power output in Washington has nearly doubled. Further increases will result from developments planned at Grand Coulee and Bonneville dams, and the municipally-owned Seattle, Eugene, Ore., and Tacoma, Wash., systems.

Labor supply in the West is adequate, although there are some notable exceptions in highly skilled classifications.

Those who wish to show the way in western industrial growth point out that the West manufactures only 40 per cent of the industrial, mining, and construction equipment it uses, and only 15 per cent of the agricultural equipment it uses.

At left above, F-80 Shooting Stars for U. S. Air Force move down assembly line at Lockheed Aircraft Corp. plant. Below, chassis-line inspectors give cars final check at new Lincoln-Mercury assembly plant in Los Angeles

Western Europe's War Wounds Begin to Heal...

Despite mountainous difficulties, production edged upward in 1948 even before Marshall Plan long-range capital expansion programs could take effect. ERP therapy gives promise for more recovery gains

DESPITE SOCIAL unrest, communist-inspired labor disturbances and myriad shortages in raw materials, equipment and transportation, Europe emerged at the end of 1948 with a remarkably improved production record, even before the Marshall Plan's long-range industrial expansion programs could take effect.

If steel output were taken as the general yardstick, the production improvement would be 23.5 per cent over 1947, for 49,616,000 net tons of basic steel were turned out in all Europe, except Russia, during 1948, as compared with 40,232,800 in 1947.

Estimated world output of steel ingots and castings reached a postwar record of 164,220,000 net tons. World pig iron output also exceeded all previous postwar records, at 118,160,000 net tons. This is a 9 per cent increase over 1947 figures in both cases. War year production from 1941 through 1944 has not yet been surpassed.

Schedule Topped — European Recovery Program's rate of steel production for all Marshall Plan countries in 1948 was set at 40,732,000 net tons; actual production was 43,288,000 tons. In 1949 ERP forecees an output of 49,257,600 tons.

Industries having top priority for steel are coal, power plants, railroads, machine tools, automobiles and shipbuilding. Consumer goods production remains slight compared with prewar standards.

International trade also improved during the yea nourished by a complex system of bilateral comme cial agreements which showed itself surprisingly su cessful as an expedient in surmounting curren exchange difficulties. The successful internation exhibitions at London, Paris, Brussels and Prag attest not only to this improvement, but to Europe metalworking revival also.

Costs Increased—Production costs in Europe ge erally increased. In Great Britain the jumps we relatively modest, amounting to less than $1 p ton for most steel products, about $1.50 for pig ir $4 for sheets and $7 for galvanized sheets. In B gium the price of pig iron was raised in April $1. to $3.65 per ton. French prices showed alarmi advances, amounting to about 16 per cent all arou An 80 per cent boost in German steel prices still pu Ruhr quotations at among the lowest in the wor

Steel nationalization is the hottest domestic iss in Great Britain, but the controversy has not couraged production yet. Output of steel ingots castings increased about 15.5 per cent from 14,2 400 net tons in 1947 to an estimated 16,576,000 tons 1948. The estimated steel capacity is now nearly million tons, to be raised to 18 million by the en 1950s. The target set by ERP for British out in 1949 is 16.8 million tons. Coal and scrap conti to be the main raw material bottlenecks.

Eleven exhibition halls, one of which is shown here, were needed to house the Brussels International Industrial Fair last year. This show and others on the continent and in England during 1948 are seen as barometers indicating the considerable European recovery since the war

This summary of the Western European industrial situation was prepared by STEEL's European editorial representatives:
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French Output Boosted — France is the second ırgest steel producer in Western Europe. Despite ne political uncertainty and strikes, the French teelworks increased their output by about 25 per ent over 1947. Furnace capacity is about 11.2 mil-on tons. Skilled labor remains tight, but materials hortages are slowly being surmounted.

Linked with France economically is the Saar dis-rict. Saar furnaces in 1948 increased their output y more than 75 per cent, with a production of ,340,000 net tons. ERP targets for France and the aar for 1948 were set at 9,180,000 tons; almost n exact hit was scored. For 1949, a combined output f 12.3 million tons is anticipated.

Production in Belgium and Luxemburg made the ıost spectacular advance in Europe. Compared with 947, Belgian steel output increased 33.5 per cent nd Luxemburg's 42.5 per cent. Combined production xceeded the rate anticipated by ERP, and it is lmost certain a bull's eye can be scored on the 8 illion-ton target set for 1949. This economic union emains Europe's leading steel exporter—nearly 3.7 illion tons were shipped last year. Britain's ex-orts totaled about 2.2 million tons.

Surprise Performance—Surprise performance in the rama of European industrial recovery was played uring 1948 by Bizonal Germany, where an ERP teel output estimate at 4.5 million tons, was actually topped by over 1 million tons. The figure set for 1949, 6,988,000 tons, should be comfortably reached. If dismantlings were stopped in Western Germany, a production of 14 million tons would be possible by 1952-53. In 1936 output was 16 million.

United Kingdom

ISSUE of steel nationalization in Britain hangs like the Sword of Damocles over the industry, with uncertainty as to whether the sword will fall likely to last until 1950 when a scheduled election could decide the matter once and for all.

The bill before Parliament calls for a public corporation to take over 107 iron and steel firms with their subsidiaries. Although the companies are to keep their names, present managements and separate identities, the government will buy up the shares at a fraction of their asset values.

The controversy will rage until 1950, but in the interim nobody knows what will happen. Managements may become apathetic. Smaller firms outside the nationalization scheme—and they represent two fifths of the industry—may begin to experience materials procurement difficulties as a foretaste of what many anticipate will occur to an even more severe extent should nationalization take place. Workers in the industry, whose relation with man-

agement have been excellent for many years, may seize the opportunity to press for higher wages. Expansion and modernization projects, particularly those pursued by Steel Co. of South Wales, may languish. As the result of the pending nationalization, the Labor government also has under review withdrawal of a $6 per ton subsidy on steel ingots.

Auto makers spent a harassed year trying to get steel, but nevertheless increased exports to 168,610 for the first 10 months, about 70,000 more than for the corresponding period of 1947. Nearly 16,000 vehicles were sent to the U. S. during the period; the average monthly shipment to the U. S. in 1938 was four. Britain is also expanding its export trade in commercial vehicles and tractors.

More machinery will probably be exported in 1949 than in 1948, despite steel shortages. The stringent supply situation did hit the British shipbuilding industry, a downward production trend resulting which may continue in 1949. Total output for 1948 of merchant shipping was only 1.2 million tons.

Bizonal Germany

BIZONAL Germany's industrial production, although surprisingly good, is now on a plateau level and may drop in 1949 if several problems, perhaps the most perplexing in Western Europe, are not solved.

Main questions before the Allied policy makers for Western Germany will be the reshaping of vertical structures in coal, steel and power industries, a final decision on dismantling, financial assistance for modernization and reshaping of the Ruhr economy so it will jibe with the rest of Western Europe.

The sweeping currency reform in Western Germany during the first half of the last year largely accounted for improved production all along the line. Basic steel, with over 5.5 million net tons turned out in 1948, was being produced at the annual rate of about 7.7 million tons during the last four months; this compares with a production of nearly 3.3 million tons in 1947 and 2,750,000 in 1946.

New Policy Hailed—Hailed by most Germans as a means for production gains in the future was the new policy announced late in 1948 by the British and Americans which calls for reorganization of the coal, steel and power industries of Bizonia. Details of the program will be carried out by custodians to be appointed by the U. S.-U. K. Control Groups which supervise Ruhr production. The membership of th top control groups will include French represen tatives. The question of final ownership of th new corporations to be formed will be decided late by a German parliament. The old corporations particularly in steel with which Nazis policies be came identified, will be dissolved and replaced b new corporations formed along technical lines t achieve a vertically integrated industry, extending i the case of steel from ore mining to rolling mills Gone will be the unhappy horizontal structure o the 30 independent steel companies created recentl by the British under "Operation Severance." Thes companies will be reshuffled into the 14 or so ne steel firms. Temporarily checked will be trade unio demands for socialization of Ruhr industries.

Dismantling Confused — Counterbalancing thes brighter prospects is the confused dismantling picture Allied nations involved have agreed, in the interest of European recovery, to curtail their activities which they have all done. Nevertheless, some dis mantlings, notably in the British zone, continue with tangled production schedules and severe los of vital capacities—mostly finishing—resulting.

First tentative steps were taken in 1948 towar reintegrating the Ruhr economy into the genera Western European network. First large-scale scra exports began during the year to several nations including the U. S. French ore began moving fo the first time since the war into Germany. Belgian Dutch and Swedish interests started negotiation with Bizonia for German steel and machinery.

Sweden

SWEDISH currency difficulties in 1948 hampere overseas trade, lifeblood of the nation.

The output of steel ingots and castings in 1948 estimated at 1,344,000 net tons, was little more tha in 1947, and production of pig iron and ferroalloy at an estimated 784,000 tons, was slightly less tha in 1947. Brightest spot in last year's activities wa the 11.2 million tons of iron ore exported, compare

Questions concerning the precise nature and size of Western Germany's industry still remain unanswered. Despite the uncertainty, however, Ruhr output increased in 1948 at such plants as this Krupp works at Essen where locomotives are repaired

th 9,520,000 tons in 1947. Exports of iron and steel oducts, however, were disappointing and showed improvement over 1947 figures. Labor shortage, well as currency complications, contributed to is situation.

The unfavorable balance of trade has worsened ospects for large and needed capital investments in vedish industry, although some reconstruction and odernization of iron and steel works is in progress.

rance

OUNTERBALANCING political and economic uncerinty in France are several beneficial factors which clude huge construction and modernization projects, owly but steadily improving industrial production, d a trend toward less government control.

On the debit side are tremendous government costs, litical instability, fluctuating value of the franc d the continually rising cost of living, the index which rose from 1.414 on Jan. 1, 1948, to 1.783 Sept. 30. Nationalized industries are working a loss, and industry wages are too low.

One major factor on the credit side is the huge wer generating program. The Genissiat dam, with capacity of 300,000 kw, was put into operation in 48. Other dams under construction include one Donzere Mondragon on the Rhone and others in e mountainous regions of the Massif Central and e Pyrenees. Full benefits are expected by 1951-52.

Plans are going ahead for an increase in blast rnace and steel furnace capacities. New sheet lls are being completed in the northern and northctern areas. These will boost sheet output by 66,000 t tons a year. A new cold-rolling mill at Montataire ll begin to operate in 1949. A hot-rolling mill to erate in conjunction with the cold will be ready by 50. A second continuous mill is being considered eastern France. Each of these units would be pable of producing 726,000 tons annually.

Steel Output Rises—Steel ingot and castings proction reached an estimated 7.7 million tons in 1948, mpared with 6,270,000 in 1947 and 8,690,000 in 39. About 7,150,000 tons of pig iron and ferroloys were produced during the year, compared with 80,000 in 1947 and 8 million in 1939.

elgium and Luxemburg

ETALWORKING industries of Belgium and Luxemrg have completely recovered from the war, and several instances production is equaling or surssing tonnages turned out in record 1929.

Largely responsible for this situation is the fact at the Belgian and Luxemburg steel industries erged relatively intact from the war, with labor ces only slightly depleted. At the time of the eration all the furnaces were not immediately put o operation because of coal and ore shortages, but September, 1948, 47 furnaces of 51 in working ler were producing output in that month reaching record 389,000 net tons, equal to an annual rate 4,668,000 tons, an all-time high.

Fuel Economy—Concurrently with greater production, considerable progress has been made in fuel economy since the war, due to the practice of using more scrap in the furnace burden and to improved control. The amount of coke necessary to produce one ton of iron averaged 944 kilograms in 1936-38; in 1946 the ratio dropped to 740 to 800 kilograms.

The present rate of production of steel ingots and castings is equivalent to over 4,620,000 metric tons annually, slightly exceeding the peak year 1929. In Luxemburg, estimated output of ingots and castings in 1948 was 2,681,000 tons and that of pig iron and ferroalloys, 2,772,000 tons. Only 1929 production exceeds these figures.

British steel industry is bouncing to new production highs, records which will be exceeded in the future as additional capacity comes in. One large expansion is for Steel Co. of Wales whose new blast furnace, the foundation for which is seen here, will be the largest in Europe

Italy

ITALIAN industrial economy is still badly out of balance.

From a production standpoint, the iron and steel industry did well, turning out 2,350,000 net tons of ingots and castings in 1948, only slightly less than prewar, and 672,000 tons of pig iron and ferroalloys, compared with 1,231,000 tons in 1939.

ERP assistance is planned which will boost the nation's steel output 25 per cent by the end of 1951. Cost of making steel in Italy, however, has skyrocketed more than in any other Western European country because of high labor rates and the necessity for Italy to import a disproportionate amount of her raw materials.

A disturbing situation also exists in the two major Italian steel consuming industries, automobiles and shipbuilding, which are operating far below capacities. Auto production is going up, however, compared with other postwar years, and export markets in Switzerland and South America are active. Italian shipyards have a capacity to produce 600,000 tons of shipping a year, but the demand for construction now does not exceed 150,000 tons.

By L. E. BROWNE
Associate Editor, STEEL

BOLSTE

NEW LIFE is being breathed into the shaky eco nomic structure of Western Europe, still badly bent three and a half years after World War II but substantial progress is shown as result of the mounting billions of American dollars being poured into rehabilitation work under the Marshall Plan.

Foreign aid will be costlier this year; Congress may be asked for nearly $8 billion, about $7 billion being destined for 16 Marshall Plan nations, Western Germany, Austria and Trieste, and the balance for China, Japan, Korea, Netherlands East Indies and possibly several other countries.

Impact of this foreign aid on the American economy will be terrific, not only in terms of dollars, but in drains on domestic supplies—steel, other metals and finished goods fabricated from them. Shortages, higher consumer costs and prices with rising taxes cannot be avoided.

Some Progress—Europe is making some progress toward recovery to which our Economic Co-operation Administration aid is contributing immeasurably. Excluding Germany, the production index is about 15 per cent over prewar 1938, but the degree of recovery varies widely among the various countries. Advances by Western Germany are encouraging. Here the index now is approximating 75 per cent of prewar, compared with 44 per cent a year ago. A 5 per cent increase in western European production of raw steel was ECA's first annual program goal and heavier output has been achieved in some cases, notably in Belgium-Luxemburg.

The Marshall Plan, under ECA, cost what it may, is a defensive weapon in a cold war of world-wide scope. As an economic device the program flies in the face of all rules known to a sound economy.

United States exported around 4,340,000 tons steel in 1948 compared to 6,477,000 tons, 1947, a decline of 2,137,000 tons. This trend is not likely to continue in the same ratio this year. More EC

Paul G. Hoffman, industrialist, is charged with distribution of the $5.2 billion ECA aid authorized by Congress from Apr. 1, 1948 to Mar. 31, 1949

New life breathed into shaky economic structure of Marshall Plan nations at tremendous cost. Impact on U. S. economy severe not only in money but in drains on raw materials and fabricated products

EUROPE'S ECONOMY

oney will be available to make up for lack of trade ollars, shortage of which accounts largely for the 948 export drop.

Gap Seen Closing—Not for long is the somewhat uradoxical spread between U. S. exports and imports rely to follow the 1948 pattern. Exports were off most 18.5 per cent last year while imports increased out 24 per cent compared with 1947. Shipments der the Marshall Plan, however, are rising.

While sales have improved some, failure has marked er-optimistic estimates by Marshall Plan European untries to boost their volume to dollar nations to .6 billion this fiscal year. Closer to reality will be 00 million. This means fewer dollars to spend, and heavier dip into ECA funds under the Marshall Plan estimated requirements covering materials, ma- inery and other goods are to be filled. For this ason more funds will be asked of ECA.

Until ECA authorizations can fill the gaps, as they entually will through higher expenditures, some iginal spending programs estimated for co-operat- g countries will fall short. They will get approxi- ately $4.5 billion worth of American goods this cal year compared with $5.7 billion estimated last pril—their own and U. S. funds included.

Production Tools—For the long pull, foreign aid to estern Europe is primarily directed toward procure- ent of tools for production, machines and equip- ent, to enable obsolete and war-damaged plants to rn out more manufactured products at lower and mpetitive costs. However, too often political con- derations tend to stress procurement of borderline mi-luxury goods at the expense of basic production ols, mill equipment and heavy capital goods.

Tentative orders for hundreds of machine tools are ld back by lack of dollars and red type. Still, plans e developing for release of many of these orders d they are expected to come through in greater vol- me this year with payment heavier from ECA funds. arlier estimates of purchases by Marshall Plan na- ons for the last calendar year were not attained, at for industrial machinery, equipment and vehicles ing reduced from $1.4 billions to $900 million.

These countries have bought less American coal an estimated, about $157 million worth against the pected $270 million; this trend is also reflected in eel exports, lumber and chemicals. Purchases of me products are heavier than estimates, including nferrous metals, bread grains, petroleum products d animal fodder.

The $5.1 billion voted for 15 months may be expended in 12 months and an additional $1.2 billion may be asked to complete the fiscal year. European participants are not selling abroad in the volume hoped, leaving fewer dollars to spend in the United States, and ECA is expected to make up the difference and more.

To Buy Tools—Machine tools, machinery, equipment and capital goods not purchased last year will be bought in larger volume during 1949. Although subject to ECA adjustments, European industrial purchases during the year ending June 30 may be estimated as follows: Steelmaking equipment $80 million instead of $50 million; petroleum refining equipment, $180 million instead of $227 million estimated last April; coal mining machinery $20 million instead of $80 million; and around $85 million for agricultural equipment. Indications are more rather than less ECA aid will be given in the next fiscal year.

What further effect this drain of dollars and goods will have on the United States economy is subject for study. There are domestic shortages now in steel, copper, zinc and lead and intensification of these scarcities well may be seriously felt in products fabricated from such metals.

Stark figures on steel exports under the aid program probably are misleading. Export of products fabricated from steel are substantial; railroad men say more locomotives have been shipped to Europe than generally supposed, also freight cars, equipment still short here.

Trend in foreign aid to Western Europe, detailed in a recent analysis of export trade by the Census Bureau, shows that a decline in privately financed exports to Marshall-Plan Europe has been taking place in the face of an increasing amount of shipments paid for by United States grants and loans.

Dollar-Hungry—Most of Europe is dollar-hungry, but the Belgians and the Swiss are relatively well off for dollars. This is embarrassing to some neighbors of Belgium who feel that country should stop buying tools, machinery and other things from the United States and other dollar nations.

Belgian mills are offering finished steel, also pig iron, in the United States, including light structurals, plates and sheets, as are some other Marshall Plan countries anxious to garner Yankee dollars. Prices have been high, up to $300 a ton for sheets, port of entry. What is happening in Belgium-Luxemburg is rather exceptional for Western Europe as a whole, but recovery there is indicative of what can be done by the will to work with a minimum of government control and political interference.

Russia's metalworking industries climb back to prewar production levels, but find goals to fourth 5-year plan difficult. Steel insufficient for construction and capital goods programs

METALWORKING production in Russia and her eastern European satellites in 1948 recovered to the level of 1940, the prewar peak, but still lags behind the fourth 5-year plan of the Soviets.

Steel output in the U.S.S.R. last year approximated 20 million net tons, second only to the United States. Czechoslovakia, Poland, Hungary and other members of the bloc produced nearly 6 million tons. The total of 26 million tons for the eastern bloc represents a large stride forward from the 12 million tons produced in these countries in 1945, and is just about equal 1940 output.

Manufacture of machine tools and trucks in Russia shows a substantial gain over prewar. Tractor output remains about the same. Production of badly needed railroad locomotives and freight cars lags far behind 1940. Construction is behind schedules.

The great bulk of Russia's productive effort continues to be directed toward capital goods. Production of metal goods for consumer use is extremely low.

Critical chokepoint in Russia's industrial program is the scarcity of steel, but other difficulties are found in low worker productivity, scarcity of skilled manpower at all levels, lack of efficient tools, and inadequate transport.

The small eastern European countries are suffering from dislocations arising from the collapse of Germany with which their economies were integrated, and from the large-scale land reforms effected after the war.

This is the picture of industry behind the iron curtain as gleaned from information from STEEL's European correspondents, from government sources, and from the fragmentary bits of information seeping through from Russia itself.

Iron Curtain Effective—Few subjects are so shrouded in obscurity as the status of Russian industry and, to a lesser extent, of the other eastern European countries. The Soviet government refuses to publish even the most basic statistical data. Harsh penalties await Russians who permit leaks of production data. What Winston Churchill said of the Soviet political attitude, "It is a riddle wrapped in mystery inside an enigma," applies equally to the Russian economy.

Notwithstanding the difficulties of obtaining accurate information, there can be little doubt that Russia has made substantial progress in the postwar years. Equally certain is that she still has a long way to go before realizing her industrial program.

Lost Heavily in War—By 1940 the Soviet Union had become one of the great industrial powers of the world. Her output of basic industrial materials such as pig iron, steel, coal and oil, approximated that of Germany and the United Kingdom. Her military potential was considerable.

When the German armies overran southwestern Russia much of the country's steel and metalworking capacity was destroyed despite the desperate efforts of the Russians to transfer equipment to safer locations in the East. As much as 60 per cent of the

HE IRON CURTAIN

By W. J. CAMPBELL
Associate Editor, STEEL

eel capacity was lost and Russian output dropped 9 million tons in 1942-44.

The Postwar Plan—When the war ended, the Soviet vernment embarked on an ambitious new 5-year an to restore her war-damaged industry and further effect by 1950 an overall 48 per cent increase in dustrial production.

Iron and steel capacity is to be increased 35 per nt. The program calls for 1950 production of 20,-0,000 net tons of iron, 27,900,000 net tons of steel d 19,500,000 net tons of rolled products (figures ve been converted from metric to net tons).

The construction program includes 45 new blast fur-ces, 180 open hearths and converters, 90 electric rnaces and 104 rolling mills.

Actually this program is lagging behind schedule d it appears unlikely that the steel mill construc-n can be completed on schedule.

Trucks, Not Passenger Cars—The plan also calls the production of 500,000 motor vehicles annually 1950, compared with 147,000 in 1940. The bulk these, 428,000 units, are to be trucks, 6400 are to busses, and 65,600 passenger cars. Motor vehicle tput in 1947 amounted to 157,000 units and last ar's production is estimated at between 180,000 d 200,000.

The plan calls for 2720 locomotives and 146,000 ight cars annually by 1950. In 1947, production locomotives amounted to only 582, compared with 7 in 1940. Freight car output in 1947 was around 000, against 47,000 in 1940. Rail transport was gh on the program and some increase could be ex-cted in 1948, although reports indicate a shortage of el held the increase low.

Tractor output planned for 1950 is 112,000 units. oduction in 1947 was only 29,000 units, slightly s than 1940 output, and 1948 production is be-ved to have been around 50,000.

Tool Building Up—Russia's machine tool industry ffered little during the war and prewar levels of oduction were reached as early as 1946 when 77,-0 units were built. In 1947, the Russians built 85,-0 units and last year about 100,000. The goal of 5,000 units should present no great difficulties as as quantity is concerned.

Quality is a different matter and Russia has been ying large quantities of more efficient industrial achinery in the United States. In 1947, for example, r $150 million exports to Russia included $81 mil-n in industrial machinery and $20 million in elec-trical machinery and apparatus. Other metal products made up the bulk of the remainder.

Shift to East—Significant in the current 5-year plan is the greater emphasis on the dispersal of industry. Soviet spokesmen, taking a lesson from the German invasion, dwell on the necessity of avoiding concentration in the vulnerable southwestern area and the building of new capacity in the Urals, Siberia and the Far East. Expansion in the eastern sections, of course, was started on a large scale in the 1930s.

Russia's problems in achieving the goals of her various 5-year plans are those of a backward agricultural nation attempting to convert to a modern industrial economy at maximum speed with a minimum of foreign help, either financial or technical. They are the difficulties of lack of know-how and of efficient tools and machinery, accentuated by the profound fatigue of a population which has endured 30 years of grueling labor and sacrifice, for which they have been insufficiently rewarded in the necessities of comfortable life. Russia's great problem is one of underproduction. The disparity between needs and available goods is great.

American experts believe it will take Russia 50 years to pass from a deficit economy to a surplus economy. This means many more 5-year plans, some of which already are being set down on paper. Stalin in 1946 outlined the goal of raising Russian steel production to 60 million tons of steel, 50 million tons of pig iron, 500 million tons of coal.

The Satellites—In the other countries behind the iron curtain are found grave problems of dislocation. Before the war most of these were agrarian countries integrated with the German industrial economy. The collapse of Germany left a great void with only weakened domestic economies to take its place. Russia has been unable adequately to supply them with the industrial goods they need. Trade with western European industrial countries has been difficult both because of currency and exchange difficulties and because the industries of western Europe were badly disrupted by the war.

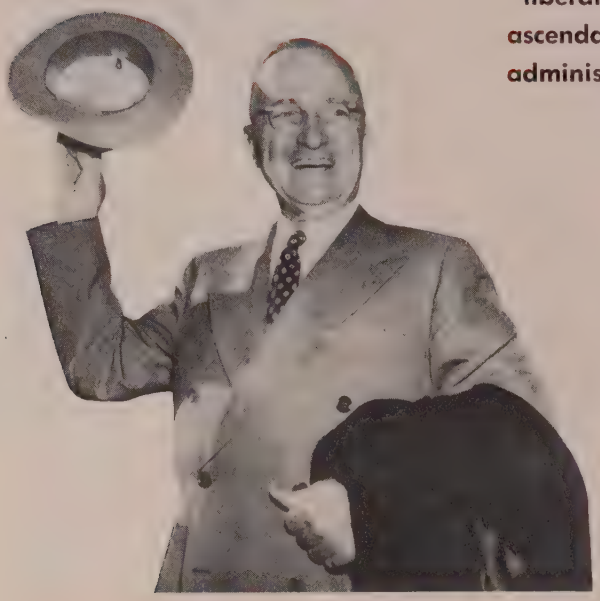
In time, new trade patterns may emerge to strengthen their economies. Already one of these is taking shape in which Poland and Yugoslavia will supply industrial materials to the two major fabricating countries, Czechoslovakia and Hungary.

Like Russia, the smaller members of the eastern bloc are preoccupied in building a capital goods industry. Consumer goods must wait.

Windows of Washington

By E. C. KREUTZBERG
Washington Editor, STEEL

Government turns leftward under Truman with Roosevelt "liberalism" and New Deal economic philosophy again in ascendancy. President's campaign pledges give tipoff on administration's demands to be made on 81st Congress



PRESIDENT HARRY S. TRUMAN

NO CRYSTAL ball is needed to foretell the kind of government the nation will get from Washington for months and perhaps years to come.

All during the political campaign President Truman, and the Democratic legislative candidates who attended him in the various states and districts, made it crystal-clear the Democratic party would continue along the "liberal" lines of the Roosevelt administration.

Time and again President Truman told his audiences that his party continued pledged to the principles of the New Deal. He told them the Republicans were the party of the "special interests" that thrive on exploitation of "the people." To make his meaning clear, he classed the following as among his enemies: Wall Street, the "giant" corporations, the public utilities, the big bankers, the railroads, the grain speculators, the real estate lobby, the medical lobby and the National Association of Manufacturers.

What Do They Mean?—What do the Democrats mean by saying they are for a "people's government?" Ironically enough, Sen. Joseph C. O'Mahoney (Dem., Wyo.), who has an unusual gift for the flowing word, expressed the philosophy by a quote from a great Republican President, Abraham Lincoln. When Lincoln's private personal papers were opened to the public at a ceremony in the Library of Congress in 1947, there followed a much better understanding as to why Lincoln won his way to enduring fame. The particular expression which Senator O'Mahoney quoted as representing the present attitude of the Democratic party, in the form of a hand-written memorandum dated in July, 1854, sets forth Lincoln's idea of people's government in the United States in these terms:

"The legitimate object of government is to do for a community of people whatever they need to have done but cannot do at all, or cannot so well do, for themselves . . . In all that the people can individually do as well for themselves, government ought not to interfere."

Truman Gave Answer—That is the formula; how do the Democrats mean to carry it out? The answer to this question needs no speculation or guessing; President Truman, echoed by the congressional candidates who appeared before the same audiences with the President, broke it down into detail. Each group of citizens, in particular, were told what it means to them personally. And the campaign utterances of the President must not be discounted.

On the more important issues everybody knows where President Truman and the 81st Congress stand. Whether the Democrats can carry out all their pledges to the letter will be demonstrated later; for there still remain a lot of Republicans and a lot of conservative Democrats in Congress; the President's program conceivably could be nullified, slowed down or modified in many important respects by such possible developments as a coalition of northern Republicans and conservative southern Democrats. For example, the President may not be able to carry out his promise to repeal the Taft-Hartley Act.

Revealing Speeches—In looking over a 2-in. file of the speeches President Truman delivered the things he told local audiences often were more revealing than his broad expressions on basic matters.

His basic promises call for repeal of the Taft-Hartley Act, for anti-inflation measures, possibly including standby price and allocations controls; federal aid to education; a federal public health program with free medical and dental services for the "four out of five" Americans who cannot afford to pay for such services; a federal policy of providing low-rent housing to low-income families; an increase in the minimum wage from 40 cents hourly to at least 75 cents; expansion of the Social Security System with increased—at least doubled—benefits to the aged, crippled, widows, mothers and children and other needy; extension of the Reciprocal Trade Agreements Act to get rid of what he termed the "crippling" amendments inserted by the Republicans; intensification of

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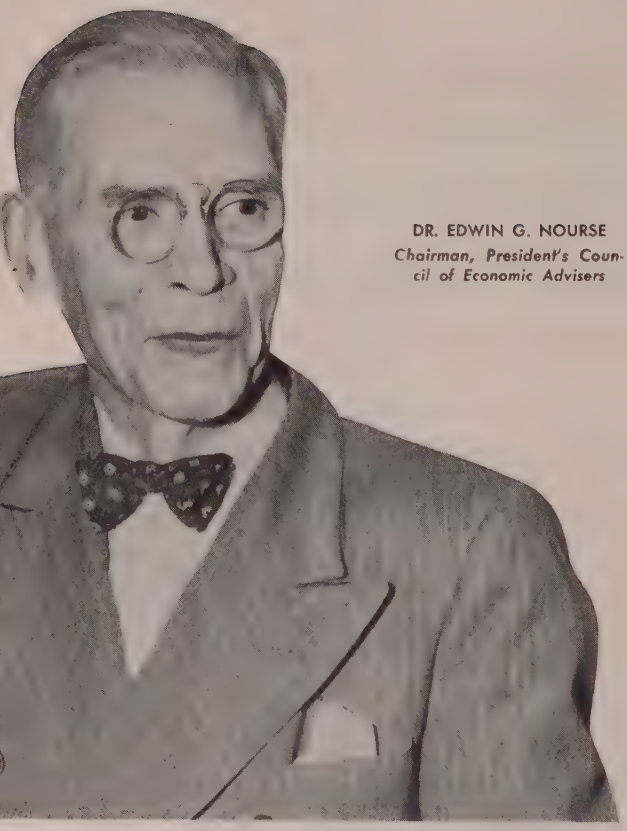


DR. EDWIN G. NOURSE
Chairman, President's Council of Economic Advisers

his "civil rights" drive; expansion of government power generation and rural electrification; establishment of a permanent farm price support program, particularly provision of ample facilities in which farmers can store their grains and other crops while they wait for a favorable market; creation of more irrigation facilities; reforestation on a broad scale; more flood control projects; an expanded campaign against soil erosion; the building up of a bigger Labor Department, etc.

These are the big issues on which President Truman and his fellow Democrats promised to deliver for the people. But, as stated above, he told his audiences something about the spirit in which he proposes to act in these matters. These man-to-man talks reveal that the President, in addition to being unalterably and violently opposed to the "special interests," believes in certain principles that are disturbing to businessmen.

Some Exceptions—On several occasions he told local groups that he does not believe in putting the government into conflict or competition with private business; rather, the government should supplement private enterprise. But he revealed significant exceptions in this overall formula.

At Milwaukee he cited big profits made by the corporations, and big bonuses paid to their officers.

At Louisville, Ky., he said, when promising to push the government's campaign against monopoly: "Two hundred giant industrial corporations own nearly half of all our industrial assets; 100 commercial banks control one-half of all the bank deposits in the United States; three steel companies own 59 per cent of all the ingot capacity of the United States; two corporations produce 83 per cent of all the tin cans."

In California and other western states he gleefully quoted from an article in the *Public Utilities Fortnightly* by Rep. George A. Dondero (Rep., Mich.), chairman of the House Public Works Committee in the 80th Congress. "We can stop the trend toward increasing the number of publicly owned power facilities . . . . the government should follow the policy of selling power at the bus bar, or at the dam, to all comers, without favoritism or discrimination," wrote Mr. Dondero. "The Republicans," charged the President, "want to get the utilities into a position to earn profits on government power so they can stick you with high prices."

Something in Mind—Every once in a while the President revealed that he had something in mind which apparently he was not ready to go into more fully at the moment. "I think it is clear," he said in a speech in Detroit, "that labor will need to link its position more closely with that of the farmers and the small businessmen."

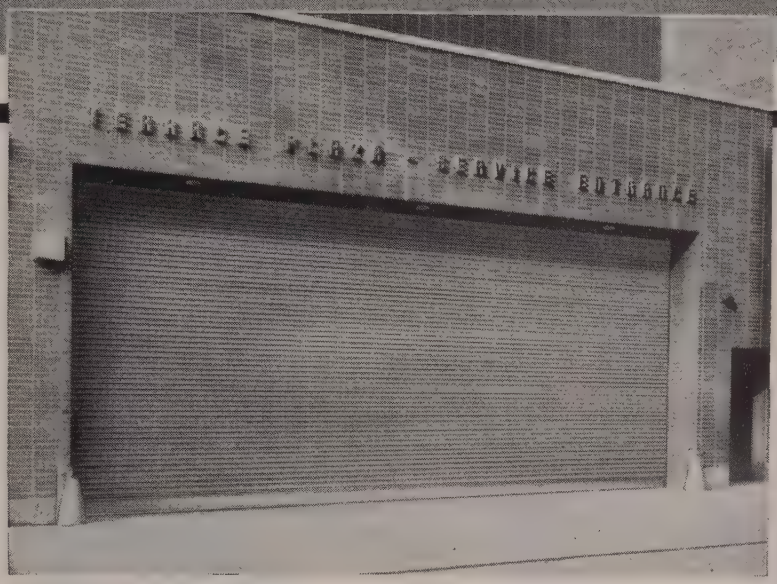
Several times also President Truman made caustic reference to the Republicans' reduction in federal income taxes. Coupling his remarks with references to large corporation profits, he spoke of the need for levying high taxes. Just what he had in mind is not yet clear. He is expected to ask for the re-imposition of excess profits taxes—with the likelihood that opponents will compromise by voting higher regular income taxes on corporations.

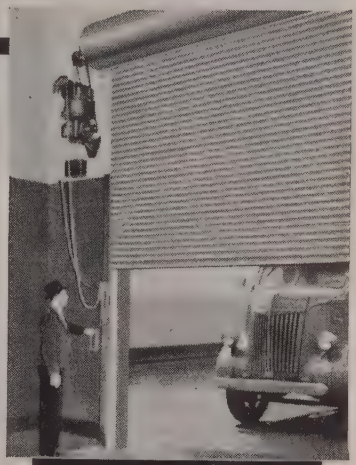
How much will the Democrats' program cost the nation? Washington observers believe it likely that federal spending will be shoved up immediately by $5 billion. That is, it may be approximately $47.5 billion in 1950 as compared with approximately $42.5 billion in the current fiscal year of 1949. This is the expectation on the theory that President Truman will get from this next session a reasonable part of what he will request. Should Congress grant him his full program as promised during the campaign the cost would undoubtedly be higher. Dr. E. G. Nourse of the President's Council of Economic Advisers, the man appointed by the President to co-ordinate his recommendations from the standpoint of their relation to the nation's economy, has been somewhat uneasy in this task as a result of contemplating a developing spotty condition in business.

Bitter Fights—The most bitter fights in the coming session of Congress are expected to involve the civil rights program and the Taft-Hartley repealer proposal. There are some strong feelings in these matters, with the likelihood of explosions. As to the rest of President Truman's program, he will get a goodly portion of what he promised in the campaign.

What these promises are is well known by the voters from Maine to California and from the upper reaches of the Mississippi to its mouth at New Orleans. No President ever has been re-elected with as definite a slate of committments as President Truman, and no Congress ever has been assembled with more binding pledges than the 81st Congress. The net effect is that government in the United States is headed into another trend toward the left.

Reasons why it pays to insist on KINNEAR ROLLING DOORS





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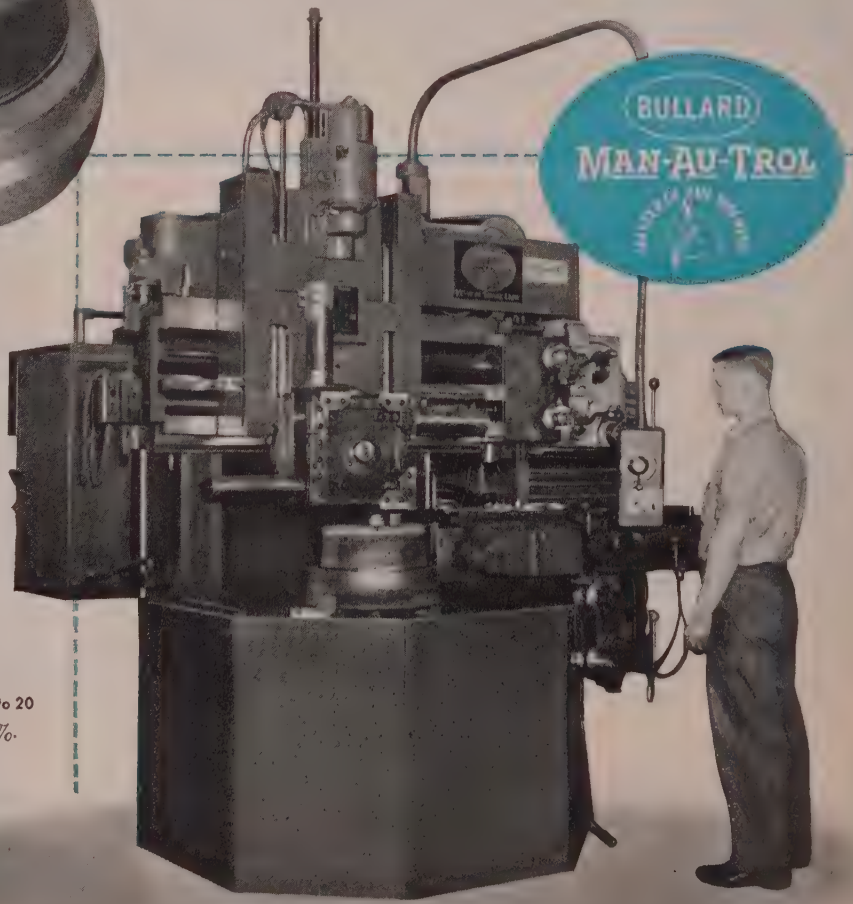


Here are shown before and after shots of a cast iron drive wheel for a Motor Grader, machined on a 30" BULLARD Man-Au-Trol Vertical Turret Lathe by Austin-Western Company, Aurora, Illinois. The former method, employing *two machines*, took *1 9/10 hours*. On the BULLARD Man-Au-Trol V.T.L., *actual cutting time was reduced to 20 minutes*... a time saving of 82.4%.

BULLARD CREATES ***NEW METHODS*** TO MAKE MACHINES DO MOR

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automotive outlook for 1949 is cloudy. Order backlogs still high, but optimism of year ago is lacking in motor capital. Steel supply may ease during next 12 months. Major troubles unlikely

RUNNING true to advance notices posted a year ago, the automotive industry slashed through a jungle of aggravating work stoppages and materials shortages, compounded of overambitious planning and the tender feelings of union labor, to emerge in the clear on Dec. 31 with a production record of better than 5.5 million cars and trucks, U. S. and Canada, or a 10 per cent hike over 1947. The total breaks down to approximately 4,025,000 passenger cars and a record-cracking 1,475,000 commercial haulers. While the aggregate is short of 1929's peak of 5,621,000, in terms of poundage and dollar value the '48 achievement takes first honors going away. Add on replacement parts production valued at $2.6 billion—10.5 per cent better than 1947 and nearly four times the prewar rate—and the year's record is the more noteworthy.

For the statistical record, a few other summations: Employment averaging 978,000, a gain of 36,000 over the previous year, 324,000 over 1941 and 100,000 more than the wartime peak; payrolls for 780,000 hourly-rated employes of $2.67 billion, up 12.7 per cent from 1947 and 127 per cent higher than 1941; wholesale value of U. S. passenger car production exceeding $4.77 billion, trucks and buses $2.1 billion; number of motor vehicles in use at year-end estimated at 41,038,000, about 6 million more than in 1941, and rolling up about 442 billion travel-miles for the year; a staggering bill for special taxes on motor vehicles of $3.4 billion, or nearly three times the 1941 impost.

Good? Yes, almost too good to be true and certainly too good to last much longer. One point should be kept in mind, however, when you glibly roll the billion-dollar totals off the end of your tongue; just divide them in half when comparing with prewar years, because you are now talking in terms of 50-cent dollars, not the good old dollars of 1939.

Enough, for the moment, of the past; what of the next 12 months? It is probably safe to say the outlook is cloudy, that the unbounding optimism of a year ago is absent, that predictions are dangerous if not apt to be laughable (viz.: Nov. 2). Still it may be possible to set down a few of the factors.

Optimistic Factors — On the plus side are: (1) Backlogs of what are described as bona fide orders for passenger cars equivalent variously up to two years of solid production, or more; (2) prospects for continued high-level government spending, which means high national income; (3) new models to whet jaded postwar appetites; (4) a productive plant now equipped to build possibly 6,500,000 cars and trucks a year; (5) likelihood of increased steel availability accruing from expanded mill capacity and retrenchment of buying by some other steel-using consumer goods industries; (6) large numbers of old cars still in operation and overdue for retirement.

Unfavorable Factors—On the minus side—and perhaps it will be well to underscore these: (1) A spreading belief that the U. S. is slowly spending itself silly, both at home and abroad, with a period of reckoning not far off; (2) the election result which, despite all the comforting assurances to business emanating

Ford Motor's Rouge plant stores coal for winter coke oven operations in huge 122,000-ton pile. Usually coal is stored in vast bins but need for ore storage space necessitated storing coal in this fashion

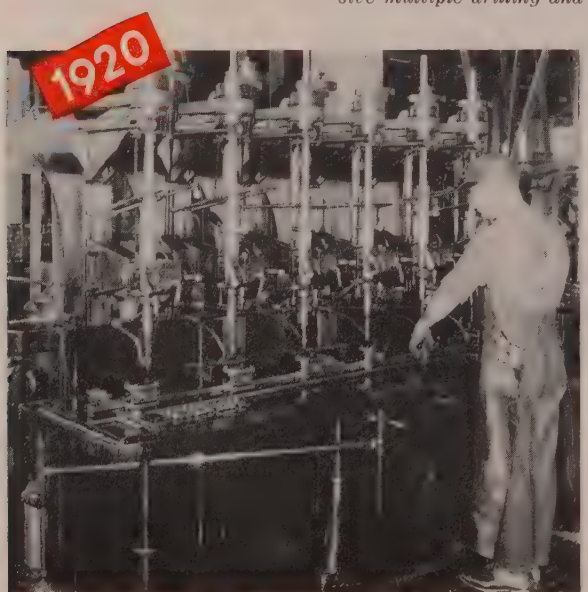
from Washington, still now does or eventually will commit the country to a near-socialism, probably tragic to a dynamic economy throughout history; (3) steady decline in prices of so-called "new-used" cars, a trend likely to wash out an appreciable, possibly a major, share of orders now on dealers' books; (4) a foreign situation in Europe and Asia, steadily worsening despite the billion-dollar shower poured out by a benevolent U. S. since 1941; (5) strong possibilities of more billions being thrown into national defense and rearmament of foreign "friends" — an eventuality which could make serious inroads on domestic materials supply and production capacity; (6) dangerously high break-even points for many manufacturers, translatable into trouble with a slight sagging in product demand or a further upward jolt to costs; (7) high prices which keep knocking more and more customers out of the market; (8) admitted return of a buyer's market in trucks over 1½-ton capacity plus scattered reports of quick deliveries possible in some of the higher-priced passenger cars; (9) practical completion of postwar expansion plans, involving accelerated capital investment, by automotive companies; (10) conclusion of three successive years of sharply rising automotive production, suggesting the old "pattern of three" which has prevailed in yearly output totals for over a quarter-century; (11) continuing difficulty of raising new equity capital to finance plant investment, with its consequent burdensome load required to carry debt capital.

Pinch To Hit Little Companies — The pinch, when it comes, will hit smaller companies much harder than the larger, integrated units, and this applies particularly to parts suppliers to the automotive industry. Before too long they will be back in the old groove of sharpening their pencils to shade prices over competitors, all the time encouraged by their automotive customers who will be under increasing pressure to trim costs of purchased parts and materials. Right now might be none too soon for suppliers to take a sharp look at inventories, if they have not already done so, keeping in mind the losses which can be incurred in a price drop such as was experienced in 1929 and 1938.

What, actually, is the automotive industry? Right now there are 56 companies building 21 makes of passenger cars, 39 makes of trucks and 20 makes of motor buses. That is what is left of the 1500-odd motor vehicle manufacturers which at one time or another in past history produced the more than 2500 recorded names of cars and trucks. These 56 companies may be considered the central core of the industry. Circled around them and feeding into them are roughly 1000 body and parts plants, and further outside this group are approximately 20,000 other companies furnishing essential materials, supplies, equipment and services. It is this heterogeneous, yet in a sense integrated, group of businesses that last year worked together to produce some 30 new passenger cars and 10 new trucks and buses every minute of every working day, and last summer passed the milestone marking output of 100 million vehicles since the modest start 55 years ago.

Price-Wage Relationships — Each of these 21,056 enterprises (shall we call them *free* enterprises?) has been and still is wrestling with the wage-cost-price-profit chain which, in an inflationary period, finds so much concentrated stress on each link. Bearing on the subject, the U. S. Bureau of Labor Statistics reports automobile prices rose 89 per cent between 1939 and September, 1948, while U. S. weekly factory wages rose 127 per cent in the same period. Thus, a typical low-price car in 1939 sold for $800, equivalent to 33.5 weeks of factory wages. In September of last year the same car, still relatively speaking, low priced, sold for $1512, or the equivalent of 27.9 weeks of factory wages. This of course does

Below at left is shown the latest thing in vertical drilling units in 1920. Note overhead lineshafts and belt drives. Contrast the equipment of 30 years ago with the massive multiple drilling and reaming machine now in use



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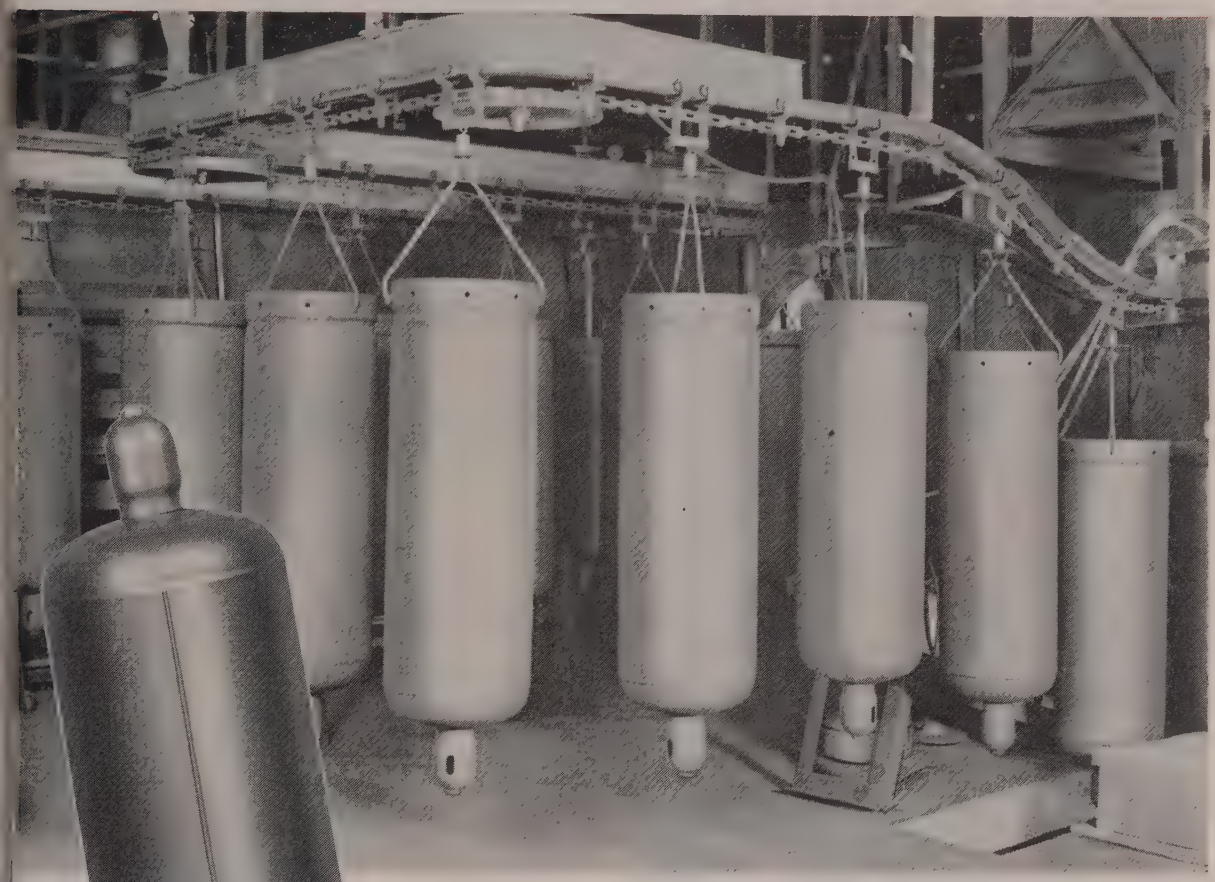

Photographs of the Lee cylinder, courtesy of the Steel Cooperage Company, Detroit.

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ot mean that it was easier for a plant worker to ay a new car in 1948 than in 1939. In the first lace, this type of individual in 1939 probably bought used and not a new car, and today the supply of oth new and used cars is insufficient to meet the emand. Beyond that, increases in cost-of-living ems—food and clothing, to name only two—have itdistanced the rise in new car prices by a wide argin and have even raced ahead of wages.

Going back half a century, price-wage relationships n be tabulated as follows:

	Average f.o.b. retail price of new U. S. automobiles	Average weekly wage of U. S. factory employees	Weeks of work needed to equal car price
99	$1559	$8.08	193
09	1719	9.85	175
19	1157	21.94	53
29	828	25.02	33
39	845	23.86	35.5
47	1580	49.25	32
48	1714	53.10	32.3

utomobile Manufacturers Association

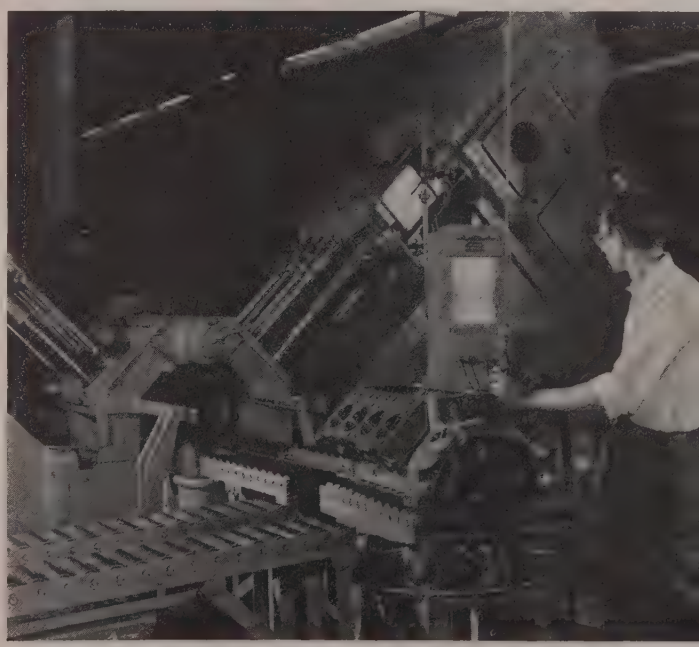
Average Car Is Larger—As indicated in the paraaph preceding the table, the improvement in reion between prices and wages from 1939 to 1948 s even better than indicated in the table, for the ason that the table shows average price of all rs sold, and a larger proportion of medium and gh priced models were being sold in the postwar ars. The independent manufacturers all were opating last year at rates well beyond even the 1941 ak, while Ford, Chrysler and General Motors were ocating more material proportionately to their gher-priced lines at the expense of those units at e lower end of the price scale.

Examining the matter of automobile company ofits, over which union and government sources e raising such a furor for the benefit of the public, becomes perfectly true that dollarwise, and lumpg all companies together in one bundle, net income 1948 was at the highest point in history. That, wever, does not tell the story, and it is unfortunate at the companies earning the profits have done such inferior job of publicizing the truth. In terms of rnings as a percentage of total sales, profits were per cent in 1947, rose to 7 per cent last year. Few employees have any conception of what profit rcentage on net worth really means, yet they read ion claims that General Motors was operating last ar at a profit rate of 35 per cent on net worth, so ey simply figure that for every dollar the corporan took in, 35 cents was profit. All industry could a much better job of interpreting financial operans for employees.

Need Better Understanding of Profits—Certainly is no sin to make a profit. The entire American nomy is based on the profit motive and to destroy would destroy the system which has made this country great. What industry should do is to apply the same expert techniques and finesse it uses in planning a complicated production sequence or a hard-hitting sales campaign to promoting a better consciousness among the public—particularly the young public—of the true nature and extent of profits, and losses incidentally.

Consider this: If the 6.3 per cent average profit on sales of the automotive industry in 1947 is applied to the wholesale price of the average 1947 passenger car, a profit of $75 is indicated. Actually, this is high because it takes no consideration of the higher profit margins on trucks, replacement parts and other consumer and durable goods which some manufacturers produce. Forgetting that factor, a comparable figure of $51 per car results from the same calculation for 1940. Now the average 1947 car had a retail price $705 higher than its 1940 counterpart, so of this amount only $24 represents increase in manufacturers' profit. The rest went to higher taxes, higher wage rates, higher costs of materials, parts, supplies and equipment. Tax increases alone have been terrific, those paid by the manufacturer rising from $54 per vehicle in 1940 to $129 in 1947, a boost of 140 per cent.

Big Tooling Jobs Completed—Prospects for major investments in tooling and capital equipment for 1949 are much dimmer than during last year, the industry already having doubled its productive plant since 1941 at a cost of about $1.5 billion. Distinctive new models introduced last spring by Ford-Lincoln-Mercury will carry through to 1950, since it is planned to amortize tools over two years instead of one. Chrysler's first new postwar models, to be introduced in a month or so, likely will carry through for two years with only minor changes next year. General Motors announces it has completed its postwar plant expansion and modernization, costing upward of $500 million. One new GM body series is now in the tooling



Air gaging is a rapid checking technique used on many basic components of the new high-compression V-8 Oldsmobile Rocket engine. Here a gaging instrument measures cylinder bores after final automatic honing

stage and will be introduced in the summer or early fall, but no further body redesigns are contemplated for 1949. The new Olds and Cadillac high-compression V-8 engines have been tooled and are in production, after a major capital investment in machinery and equipment for both. Among the independents, capital expenditures will be limited for 1949, although 1950 should see a resurgence of activity in this direction. An exception is in respect to automatic transmissions, which several manufacturers have in the planning stage; they will call for an appreciable degree of machinery buying.

Styling Disappoints Many—To many the first efforts at postwar restyling have been disappointing. There is a sameness throughout the list of passenger cars—bulging sides and humped-up backs; bodies that are difficult to get in or out of; low headroom for tall persons, cramped legroom in rear seats, etc. Hoods and front fenders protrude to the point where it is impossible for the driver to tell front wheel positions. Fenders have become so all-enveloping that the proper cooling of brakes is regarded by some engineers as a real problem. Massive sheet metal components, when damaged, run repair bills to staggering proportions. Unquestionably, utility and convenience have been further sacrificed to beauty of line and bulky appearance. What this may mean when the buying public again becomes choosy is something Detroit might well start to worry over, if worry it must.

Reports are heard to the effect one manufacturer, possibly more, will make an effort this year to introduce what is termed a "price job", that is, a model so designed and fitted that it can be sold well below the Chevrolet-Ford-Plymouth level. It would probably be one of these three stripped down, both inside and outside, to the point where it could be retailed for, say, $1100-$1200.

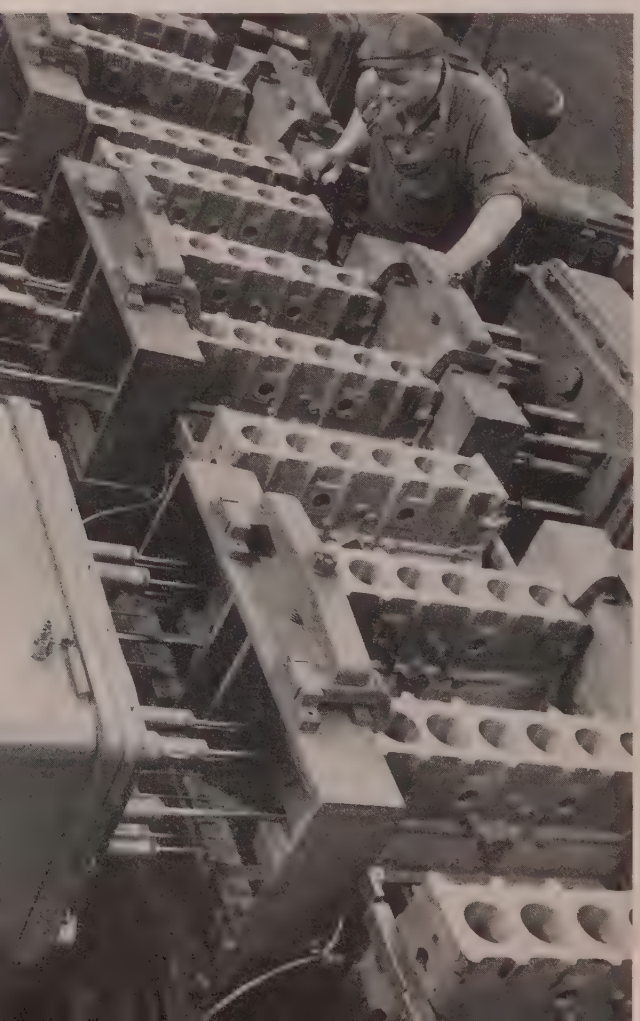
Transfer-Type Tools Emphasized—Manufacturing-wise, special emphasis continues to be placed on cutting costs and there have been two major trends in equipment installations, both aimed in this direction. One is what might be termed synchronized processing, as exemplified by the many varieties of transfer-type machine tools; and the other, closely related to the first, is automatic mechanical handling of parts between operations.

Automatic handling of parts between operations has been established as a long-range project by Ford, with a special "automation" department devoting its full time to the adaptation of the scheme to a steadily mounting list of processes. The method involves the use of mechanical "hands," rollover devices, feeders, scrap unloaders and other mechanical means of doing what formerly required manual effort. Principal applications thus far have been on press lines to transfer a part from one press to the succeeding unit, and to welding machines where composite assemblies are spot welded. Much more is going to be heard of this work, Fisher Body also being active in the same field.

Steel, Components Cost More—Unfortunately most of the cost savings effected by improvements in processing and handling equipment have been canceled out by added expenses involved in obtaining sufficient steel and in pursuing parts from lagging vendors. The extent to which the automotive industry has been making use of so-called "conversion" steel is not known exactly, although certainly it is appreciable. A figure of 1,500,000 tons for the year is conservative in some opinion.

In addition, of course, outright purchase of steel mills by motor companies—Studebaker, Hudson, Kaiser-Frazer—has tacked a pretty penny on materials bills. Eventually these purchases may have to be written off as total losses; even so it has apparently been worth the gamble.

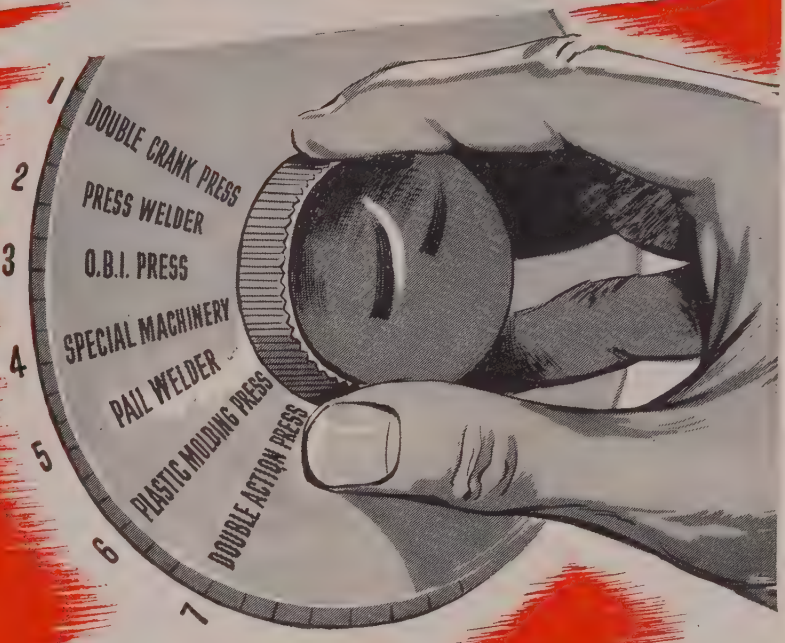
List Prices To Hold—Any weakening in retail demand, or a slight improvement in mill shipments of steel to automotive plants, will be met by an immediate suspension of emergency measures to obtain steel. Some of the more pessimistic observers see this as a possibility by the second quarter of this year. However, it is not likely car manufacturers will make any early reductions in their list prices, even if demand should dwindle. As in the past, the first "price bait" to be offered automobile buyers will come from dealers in the form of stepped-up allowances.



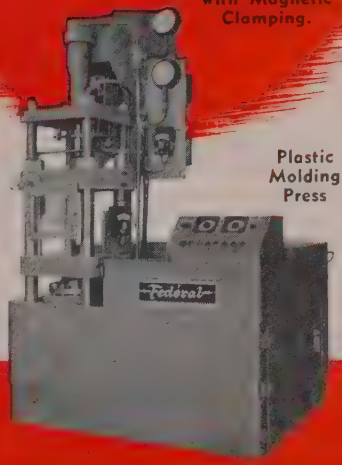
Transfer-type machining units are steadily finding wider usage in the automotive industry. Here an operator watches the progress of blocks as they are cycled automatically through a line of drilling heads which drill, ream and chamfer end holes

A Safe Combination

Double Action Single Crank Press. Capacity 120 tons.



Federal 350 KVA 84" Sheet Flash Welder with Magnetic Clamping.



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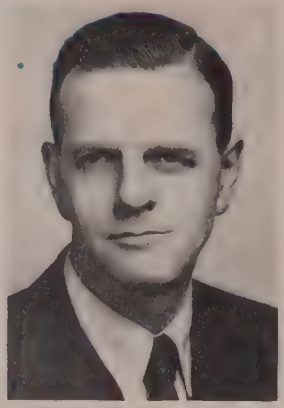

A. S. MARVIN

E. V. CRANE

A. S. Marvin has been appointed division engineer in charge of the Pittsburgh engineering department of American Bridge Co., subsidiary, U. S. Steel Corp. He succeeds **F. S. Merrill,** who will continue with the company on special engineering assignments. Mr. Marvin began his employment with American Bridge Co. as a draftsman at the company's Gary, Ind., plant. He later became an engineer in the Chicago Division office, and went to the Pittsburgh office in 1947 as assistant division engineer.

—o—

A. W. Wagner has been appointed general parts division manager, Thew Shovel Co., Lorain, O., with direct supervision over plants Nos. 3 and 5, both located in Elyria, O. Mr. Wagner will temporarily continue his duties as manager of parts division sales. **Cyril Brecknock** has been appointed manager of parts division manufacturing in charge of plant No. 5, and **N. W. Anderson,** manager, parts division operations, being responsible for parts division planning, production control, warehousing and shipping. **Don Lewis** has been appointed manager of parts division publications and catalog design.

—o—

Henry Huber, former New England zone manager, Plomb Tool Co., has been appointed district sales manager of Ohio, Michigan and Indiana territory for Bingham-Herbrand Corp., Toledo, O. He will maintain headquarters at Fremont, O. **Hugh Nyberg,** former sales representative for Plomb Tool Co. in the New England area, has been made district sales manager for Herbrand in the same territory, with headquarters at Southbridge, Mass. **Arthur Brandt** is representing the company in Chicago, and **William T. Sherry** is in charge of sales in the Milwaukee area.

—o—

R. S. Stevenson has been appointed assistant general sales manager for the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Stevenson, who joined the company in 1933, has been a member of the division sales organization for the past 15 years. He had been southwest territory manager.

—o—

Hydraulic Press Mfg. Co., Mt. Gilead, O., announces the appointment of **E. V. Crane** as chief engineer. Mr. Crane is well-known as a practicing engineer and as an authority and author of technical books on the subject of metalworking. He served his apprenticeship with General Electric Co., Schenectady, N. Y., where he contributed to the early development of automatic welding machines. He later was associated with Crooke Works, Die Casting Division, National Lead Co., and for 24 years was connected with E. W. Bliss Co. in various research and engineering capacities. He was chief development engineer of that company's Brooklyn, N. Y., plant before he resigned in 1945 to join the consulting and research organization of Sam Tour & Co. Inc. as vice president in charge of the mechanical engineering department.

—o—

D. C. Daniel has been appointed secretary of the Federal Trade Commission, Washington, succeeding **Otis B. Johnson,** who retired Dec. 31. Associated with the commission since its organization, Mr. Johnson has been its secretary since 1922.

—o—

A. W. Pingel has been named industry manager of the newly formed Industrial Parts Division, Reynolds Metals Co., Louisville. Mr. Pingel came to Reynolds from Revere Copper & Brass Inc., Rome, N. Y., where he served as assistant sales manager, aluminum and magnesium, for four years.

—o—

Los Angeles Chamber of Commerce has named as its new president, **Earle V. Grover,** president, Apex Steel Corp. A director of the Chamber of Commerce for the past four years, Mr. Grover has been active in the organization since 1928. Metalworking executives named to the Chamber's board of directors are: **Harry G. Haake**, vice president, Ceco Steel Prod-

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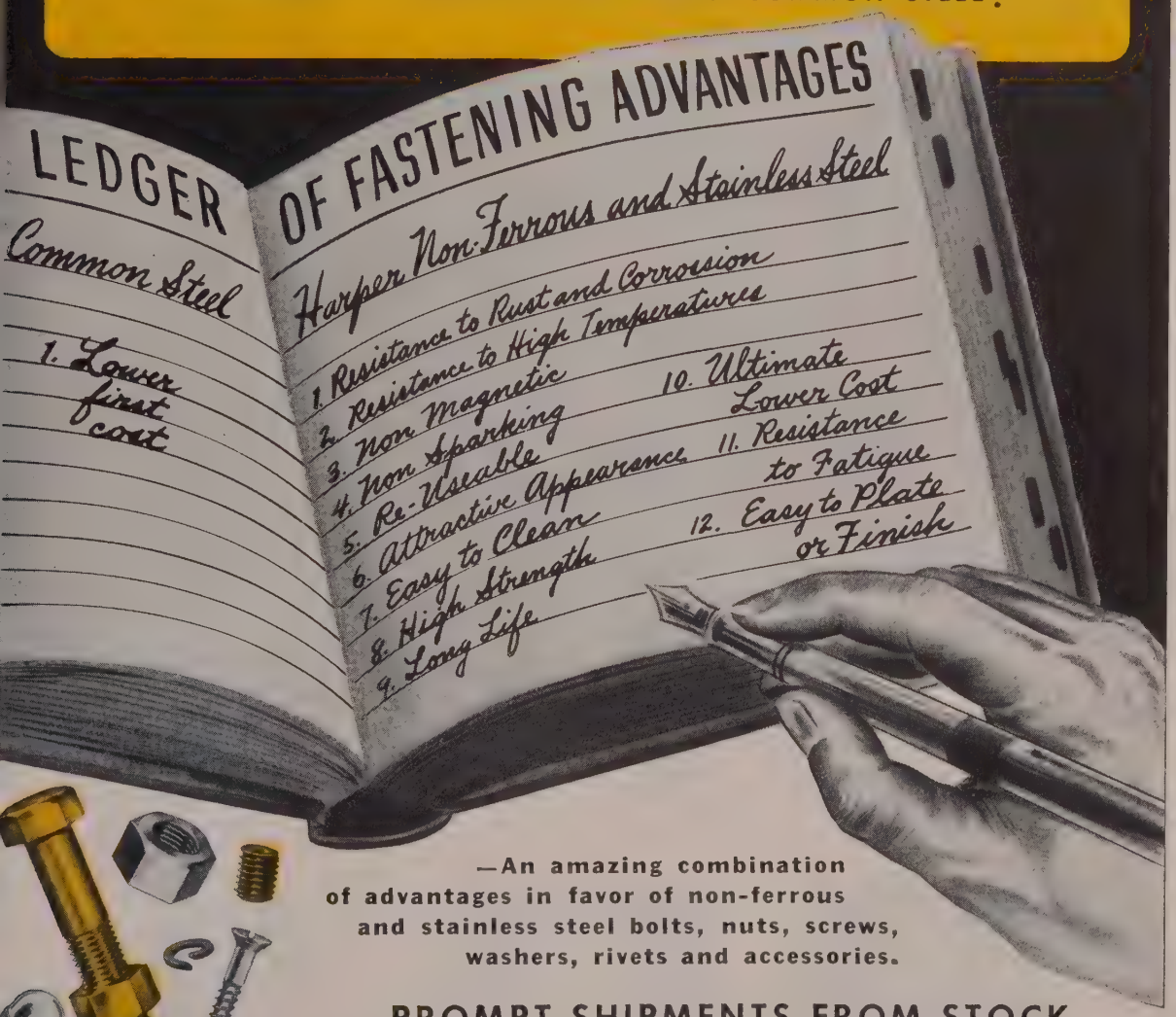

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ucts Corp.; **Kenneth T. Norris,** president, Norris Stamping & Mfg. Co.; and **Morris B. Pendleton,** president, Plomb Tool Co. This is the first time in the Chamber's history that a steel executive has headed the group, and Mr. Grover's election by Los Angeles civic and business leaders is considered a tribute to the growing importance of the western steel industry.

—o—

Charles L. Huston, first vice president, Lukens Steel Co., Coatesville, Pa., started his 74th year of continuous service with the company on Dec. 15.

—o—

Ray H. Stuff has been appointed sales manager, Nox-Sound Division, Nox-Rust Chemical Corp., Chicago. He became associated with the Stoker Sales Division, Fairbanks, Morse & Co., in 1936, and in 1945 was made sales manager of a specialized division of A. O. Smith Corp., Milwaukee.

—o—

At a meeting of the capital district chapter of the Institute of Scrap Iron & Steel Inc. held in Albany, N. Y., **Philip Sher,** Hudson Scrap Iron & Metal Co., Albany, was elected president. He succeeds **Louis Sirk,** Trojan Scrap Iron Corp., Troy, N. Y., who was named chairman of the executive committee. Other officers elected for the 1948-49 term were: **Leonard Klein,** Joseph Klein Co., Albany, N. Y., vice president; **Herman Garbowitz,** Samuel Garbowitz Co., Schenectady, N. Y., treasurer.

—o—

Frank G. Hoover, vice president, Hoover Co., North Canton, O., has been elected president, succeeding his elder brother, **H. W. Hoover,** who becomes chairman of the board.

—o—

W. A. Redpath has been appointed manager of the Philadelphia plant of Joseph T. Ryerson & Son Inc. to succeed **C. L. Hardy,** who recently was elected assistant vice president of the Ryerson organization, with headquarters at Chicago. Mr. Redpath, who joined the company in 1916, has been assistant manager of sales, Chicago plant, since 1945.

—o—

James A. Anderson has been appointed assistant general sales manager, Babcock & Wilcox Tube Co., Beaver Falls, Pa. Mr. Anderson joined this company in 1941 in the district sales office in New York. He previously was connected with the Steel & Tubes Division, Republic Steel Corp., as a member of the sales staff. He has been assistant manager of Babcock & Wilcox Tube Co.'s New York office since 1944. In his new position he will have headquarters at Beaver Falls. **William H. Buley** has been appointed manager of stainless sales for the company, also maintaining headquarters at Beaver Falls, in which office he has been since joining the company, recently serving as manager of the company's general sales office.

—o—

Robert L. Hartman has been appointed production manager, Hanford Foundry Co., San Bernardino, Calif. He was associated with Utility Electric Steel Foundry for 14 years prior to joining this company. **Edwin C. Relph,** former production manager, has been named works manager.

—o—

Walter K. Benchley, special assistant to the chief enginer of the Buffalo plant, Hewitt-Robins Inc., New York, has been reappointed purchasing agent of the Hewitt-Rubber Division of the company. **William A. Fleischman** was appointed to the newly created position of purchasing agent for the company's Restfoam Division.

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Taylor Lymann, editor of "Metals Handbook," has been made associate editor of *Metal Progress.*

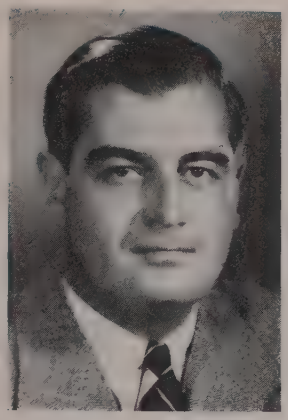
—o—

Maj. Gen. Oliver P. Echols, U. S. A. F., retired, will become chairman of the board of Northrop Aircraft Inc., Hawthorne, Calif., on Feb. 1, succeeding **Richard W. Millar,** retired. Mr. Millar remains a board member and chairman of the Finance Committee. For the past two years, Mr. Echols has been president

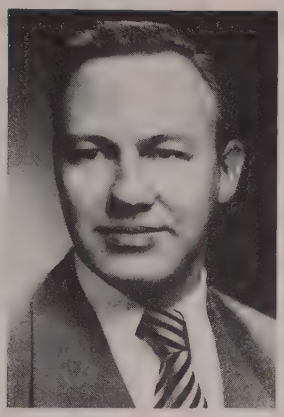
W. A. REDPATH

JAMES A. ANDERSON

WILLIAM H. BULEY



WALTER D. MONROE JR.



CHARLES H. T. WILKINS

FRANK G. LINCOLN

of the Aircraft Industries Association, and will continue in that capacity until his successor is chosen.

—o—

Walter D. Monroe Jr. has been elected president, Chicago Steel Service Co., Chicago, succeeding his late father, who was the founder of this warehouse steel distributing firm. Mr. Monroe has served as vice president since 1937. He is a graduate in metallurgy of Purdue University. **Donald F. Grace,** vice president, was named vice president in charge of sales. He has been with the company since its inception in 1925, and in an executive capacity since 1930. **Thomas J. Carmody,** associated with the organization since 1927, was re-elected secretary.

—o—

National-Standard Co., Niles Mich., has established an industrial fellowship at Mellon Institute in Pittsburgh to investigate in a long-range program major problems related to the technology of fine wire products, such as tire bead wire, strand for heavy duty tire casings, music wire, and aircraft and textile wires. Also to be studied are problems related to flat strip for use in piston rings, razor blades, clock and watch springs, pen points and umbrella ribs. The fellowship is headed by **Charles H. T. Wilkins,** formerly metallurgist, Copperweld Steel Co., Glassport, Pa.

—o—

Frank G. Lincoln has been elected chairman of the board of Hy-Pro Tool Co., subsidiary, Continental Screw Co., at New Bedford, Mass., manufacturer of high speed steel commercial and precision ground taps. Before retiring in 1946, Mr. Lincoln was with Morse Twist Drill & Machine Co. for 43 years as vice president in charge of sales, prior to its consolidation with Van Norman Co.

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The following officers were elected for the year 1949 by the St. Louis Chapter of Institute of Scrap Iron & Steel Inc.: President, **Samuel I. Lefton,** B. Lefton & Sons Iron & Metal Co., St. Louis; first vice president, **Charles Forcheimer,** Jack R. Forcheimer & Son, St. Louis; second vice president, **Sidney Grossman,** Grossman Iron & Metal Co. Inc., St. Louis; third vice president, **Sol Mack,** Frank Mack Co., Edwardsville, Ill.; and secretary-treasurer, **George Gillerman,** Gus Gillerman Iron & Metal Co., St. Louis. **A. P. Ashner,** Lefton Industrial Corp., St. Louis, was elected chairman of the board.

—o—

Metal Treating Institute has elected the following officers for the year 1948-1949: President, **Charles H. Hewitt,** Dayton Forging & Heat Treating Co., Dayton, O.; vice president, **Fred Heinzelman Jr.,** Fred Heinzelman & Sons, New York; and past president, **R. G. Sault,** Porter Forge & Furnace Inc., Somerville, Mass., elected to serve as a member of the board.

—o—

William M. Bruttriss, Tinnerman Products Inc., Cleveland, advertising manager and sales promotion manager, addressed the Society for Advancement of Management meeting at New Haven, Conn., in December on "The Use of Modern Fasteners in Present-Day Industry."

—o—

Askania Regulator Co., Chicago, announces appointment of **Frank E. Early** as its representative in the Detroit area. Mr. Early, who has worked with Askania, manufacturer of precision controls for industry, since 1936, will represent the company for all its products. His address in Detroit is 15234 Michigan Ave..

—o—

C. A. Geatty, a director of National Lead Co., New York, and manager of its metal department since 1942, has retired after 49 years of service with the company. He started his career with John T. Lewis & Bros. Co. in 1899, now a National Lead subsidiary, at Baltimore. He became assistant manager of the Baltimore branch of National Lead in 1928 and manager of the Atlantic Branch Metal Division five years later. In 1938 Mr. Geatty became company manager

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Overall Size of Piece: 6¼" x 2⅛" x ½".

Stock: SAE 1335 Steel—½" thick, 2⅛" wide.

Operations: Pierce one 1 3/16" round hole and one straight-side hole 1 3/16" x ⅝"; trim ends and sides.

(At left) Scrap is blown out of die through special chute. Blanked pieces drop through cavity provided in bed of press. Power conveyor installed below bed discharges finished pieces in drum container.

- **New Air-Cooled Floating Friction Block Clutch**—Simple design reduces starting inertia 85% assuring long trouble-free service under severe operating conditions.
- **Built-In Automatic Filtered Oiling System** puts right amount of oil where needed—*including flywheel bearings.* Eliminates sludge—increases press life—conserves oil.
- **Sturdy, Extra-Heavy Steel Welded Frame** reduces deflection, minimizes vibration. All weldments stress relieved before machining for accurate, permanent alignment.
- **Pitman Wrist-Pin Design**—Permits precision fitting of component parts, assures closer operating tolerances, promotes longer press life.
- **Air Pressure and Oil Pressure Safety Switches**—Safeguard press, prevent operation should pressures drop below safety point.
- **Safe, Convenient Electrical Controls**—Save time on die adjustments and add safety to trial strokes.
- **Balanced Flywheel, Balanced Clutch and Air Counterbalanced Slide**—Insure quiet, smooth-running performance.

One of nine Danly Presses at Chain Belt Co., Milwaukee, Wis., this 400-Ton, Straight-Side Unit speeds output of ½" thick side bars for "Chabelco" drive chain. A production rate of 1200 pieces per hour is attained with one operator at a press speed of 20 strokes per minute. The job is set up with a two-stage progressive die on a Danly Precision Die Set. Sixteen-foot lengths of ½" x 2⅛" SAE 1335 steel strips are fed by hand.

Tolerance of .003" held—Setup time reduced

The finished pieces are held to a tolerance of .003" on the hole centers. Accuracy of .010" is maintained around the blanked outline.

Setup time for this and other jobs is greatly reduced by reversible slide controls on the Danly Press. Because the press can be stopped at any point of its stroke *and quickly reversed* by push-buttons, die adjustments are made in a fraction of the time usually required.

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Write today for free bulletin describing Danly's new and exclusive press engineering features. Find out how Danly Presses can help you cut costs and increase production. For free engineering assistance, send details about your problems. You will receive specific recommendations without obligation.

WIDE RANGE OF PRESS SIZES

Danly Straight-Side Presses of 1, 2, and 4-point design are built in a wide range of sizes and in single, double, and triple-action types for capacities from 100 to 3000 tons.

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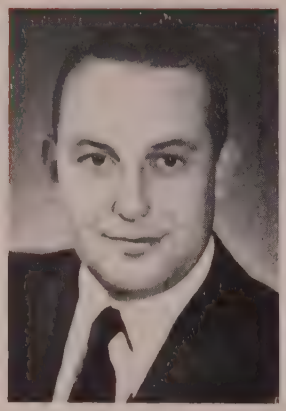
25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

JOHN E. WELLS

Appointed special sales representative, Industrial Parts Division, Reynolds Metals Co., Richmond, Va. Noted in STEEL, Dec. 20 issue, p. 89



PAUL W. COTTON

Appointed manager of industrial relations at South San Francisco plant, Bethlehem Pacific Coast Steel Corp. Noted in STEEL, Dec. 6 issue, p. 107

JOHN S. CORT JR.

Appointed assistant to the president, Martin Dennis Co., Newark and Kearney, N. J., subsidiary of Diamond Alkali Co., Cleveland. Noted in STEEL, Nov. 22 issue, p. 64

of metal sales, and in 1940 was elected a director and member of the executive committee. He will continue as a director of the company.

—o—

Herbert E. Smith, president, United States Rubber Co., New York, was elected chairman of the board and chief executive officer of the company, and **Harry E. Humphreys Jr.,** vice president and chairman of the finance committee, was elected president and chairman of the executive committee. **F. B. Davis Jr.,** chairman of the board and chief executive officer for 20 years, retired Dec. 31, but will continue as a director and member of the finance committee. **Arthur Surkamp,** treasurer, was elected vice president and chairman of the finance committee to fill the vacancy created by Mr. Humphrey's promotion. Mr. Surkamp was also made a director and a member of the executive committee. **Herbert M. Kelton,** general auditor, was elected treasurer.

—o—

Forty business associates and friends met at the Detroit Golf Club Dec. 2 to celebrate the 50th birthday of **L. K. Lindahl,** president, Udylite Corp. At the speaker's table were: **R. L. Spitzley,** president, R. L. Spitzley Heating Co.; **W. M. Cornelius,** chairman of the board of Parker Rustproof Co.; **C. H. Reeme,** vice president and treasurer, Udylite Corp.; and **E. R. Grace,** vice president, Grant Advertising Inc., who acted as toastmaster.

—o—

Harry Crump, for the past year manager, cutting tool sales engineering, Carboloy Co. Inc., Detroit, has been named assistant to the sales manager. **J. S. Gillespie,** formerly in charge of wear parts sales engineering, has been appointed manager of tool and wear parts engineering, succeeding Mr. Crump. **A. F. Dobbrodt,** formerly special products sales engineer, has been advanced to manager of mining sales engineering.

—o—

Adolphus C. Pilger Jr. was presented the Horning Memorial Award for oil and fuel research for 1947 by the Society of Automotive Engineers. Mr. Pilger is associated with Tide Water Associated Oil Co., Detroit. The award memorializes the life work of the late **Henry L. Horning,** who was a past president of SAE, and president of Waukesha Motor Co., Waukesha, Wis. Mr. Horning was a leading authority on automotive engines, fuels and lubricants. Presentation of the award will be made during the SAE annual meeting, Jan. 10 to 14.

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Bliss & Laughlin Inc., Harvey, Ill., announces the opening of a district office in Indianapolis and the appointment of **Robert W. Ritchie** as Indianapolis district manager. Mr. Ritchie is a graduate metallurgical engineer and, for several years, has worked out of the Harvey general office as a sales promotion engineer. Prior to joining Bliss & Laughlin, Mr. Ritchie was employed in the metallurgical department of Carnegie-Illinois Steel Co. for a number of years.

—o—

William A. Beatty has been appointed manager, Feeder Division, Westinghouse Electric Corp., Pittsburgh, and **Leonard H. Loufek** appointed industrial manager of the central district for the corporation. Mr. Loufek succeeds **C. H. Weaver,** named manager of the company's newly formed Atomic Power Division.

o

Officers of the Automotive & Aviation Parts Manufacturers Inc. for 1949 are: President, **M. P. Ferguson,** President of Bendix Aviation Corp.; vice president, **R. H. Daisley,** vice president, Eaton Mfg. Co.; secretary-treasurer, **J. L. Myers,** president of Cleveland Graphite Bronze Co. Members elected to the board of director for a three-year term are: **L. M. Clegg,** executive vice president, Thompson Products Inc.; **A. G. Drefs,** president, McQuay-Norris Mfg. Co.; **W. G. Hancock,** president, McCord Corp.; **D. H. Kelly,** executive vice president, Electric Auto-Lite Co.; and Mr. Myers.

The Transport (6 types) is half-truck, half-platform . . . does the work of both at a substantial saving. Bin Sections, Pallets, Die Racks, Shelves or Superstructures are quickly movable on the Transport (see below).

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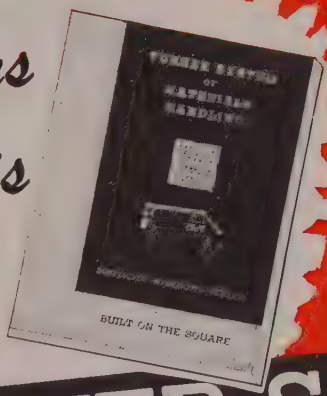

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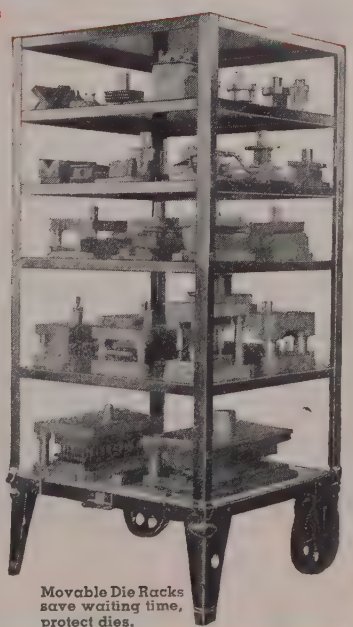

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New Aid Industry In Reducing Costs

By WALTER F. TOERGE
Associate Editor, STEEL

Fig. 1—Whirring at 1750 revolutions per minute, teeth of this high speed friction saw cut heavy steel sections at the rate of 13 ft per minute. U. S. Steel photo

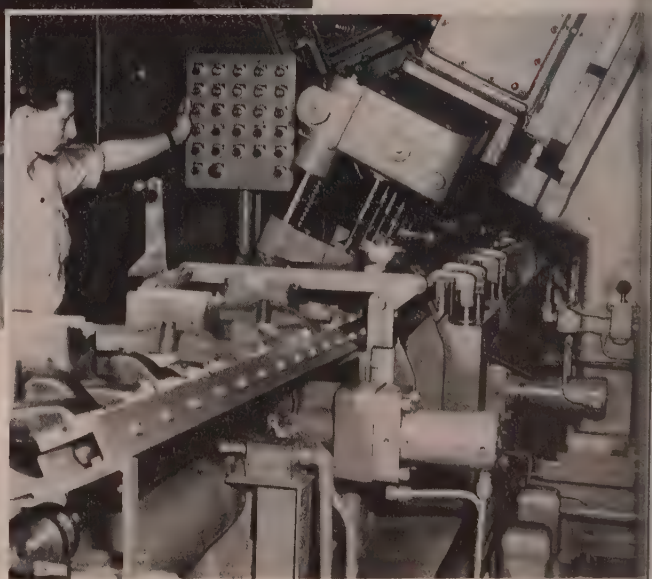


Fig. 2—This thirteen-station transfer type machine produces unique water and intake manifold for the Kettering engine. Operator at control panel just released a casting into first machining station

PRODUCTION SHORTCUTS

Emphasis in the metalworking industry is concentrated more than ever on the bee-line approach to production problems. Examples of profitable operations attest to the economic effectiveness of this trend

INGENUITY, improvisation and process refining continue to be the metalworking industry's answers to problems of high manufacturing costs. Shortcuts of every description are evident in casting, forging, forming, machining processes and particularly in the allied fields of materials handling, product design, heat treating, inspection and testing. While savings in time, labor and materials resulting from some of these production modifications are spectacular, others of a less profound nature are nevertheless significant.

Casting—American foundries are currently in the throes of complete mechanization, with approximately one-half of their total equipment less than 5 years old. Increasing the yield of high quality castings at reduced cost, a machine now in operation at one foundry is believed to be the first completely automatic molding unit for mass production of castings by multiple molding methods. All of the functions and operations necessary to produce molds for introduction of sand ingredients through completion of multiple molds stacked six-high ready for pouring are performed by the self-contained unit.

By setting the mold horizontally and tilting it at an angle while pouring, another company turns out high strength nickel molybdenum iron crankshafts. Better feeding and improved directional solidification are reported to result from this method. Mounted in specially-designed trunnions, the mold is rotated through a 90-degree angle to the vertical position while cooling.

Used in the jewelry trade for many years, the precision casting or "lost wax" process is now applied industrially to a surprising extent. One casting concern, for instance, is making hollow blades for gas turbines which cannot be forged or machined readily from solid stock. A spray nozzle for an oil furnace atomizer, made of wear-resistant material, is another product. This particular threaded part has eighteen 0.110-inch holes drilled in the circled area. By using the precision casting process, the part is produced at a saving of 25 per cent. Castings with tolerances of plus or minus 0.005-in. per inch of casting and in sections under ¾-in. tolerance are held to plus or minus 0.003-inch at this plant.

Progress in casting high melting point superalloy steels is marked by a permanent mold centrifugal process now in use in an eastern foundry. Molten metal is introduced and solidified under pressure within heavily constructed molds to produce cylindrical and tubular parts.

Forging and Forming—An estimated 2 hours per 8 hours of running time, in addition to time saved in setting up the machine, have resulted from an improved method of performing batching operations on a punch press at one airplane company. By fastening an adapter plate to a bolster plate with four dowel pins and four set screws, accurate work is obtained. Prior to the development of the present setup, plates had to be wired at one end to keep them from shifting.

Forming streamlined structures, such as parts of an airplane skin, by stretching a sheet of metal over die forms is proving to be an efficient way to manufacture many complicated shapes. Stretch forming magnesium sheets at an aircraft plant is aided materially by the use of spun glass "blanket" to overcome friction between sheet and stretch blocks.

Reducing assembly time on 11 sizes of unit speed heaters by nearly one-half, from 63½ to 34 minutes, one manufacturer not only revamps final assembly procedures, but by design and tooling changes, also simplifies and standardizes feeder line production of parts. Major design improvements contributing to lower assembly time include a 4-arm motor support and steel bracket, which replaces a 6-arm unit. Formerly, 10 holes had to be drilled individually; now 8 holes are formed simultaneously in the cabinet inlet or back panel.

Heat Treating—More efficient heat treating techniques are also being exploited. Sprocket production in a motorcycle plant recently jumped 50 per cent as a result of an electronic method of selective hardening teeth of a 55-tooth wheel. Using an induction generator and a 2-position work table equipped with special jigs and fixtures for automatic operation, the company also improved its product.

By a new case-hardening technique, one automotive parts manufacturer produces exceptionally clean work, having a file hard case and a soft, tough core. Distortion is held to a new low; and time, money and floor space are saved. Advantages are obtained primarily by quenching from a temperature below the critical temperature of the core. Process is essentially a modification of the carbonitriding method wherein parts are heated in a controlled atmosphere composed of generator gas, hydrocarbon gas and ammonia.

Degree of annealing can be controlled within very close limits to produce a highly machinable structure in forgings, using a relatively new method of cyclic annealing. As forgings leave the press, they are

introduced into a salt bath operating at a temperature below the critical and above the nose of the S-curve of the particular steel. Parts remain in the bath for the time indicated by the curve for completion of the transformation. A uniform, coarse, pearlitic structure is produced by this treatment. As used by one automobile parts manufacturer to anneal alloy steel forgings, the entire process requires only 10 to 60 minutes compared with 5 to 25 hours needed with conventional annealing methods. Parts are annealed uniformly and all traces of scale removed.

Elsewhere in the industry, use of induction heating is found to triple die life by reducing scale on billets for forging tractor track links. Production at one plant is at the rate of 336 heated billets or roughly 2300 lbs per hour. Scale is less than 0.001-inch compared with the normal expectancy of 0.050 to 0.100-inch. On a year-long test, production averaged 18,500 pieces per finishing die and 35,000 pieces per blocking die, which represents almost three times the life normally expected of the dies.

Production is increased some 300 per cent by a simple installation for 3-second annealing case-hardened roller chain pins. Sole function of the operator is to feed the pins into a chute, which rolls them into position for "flame softening" treatment. One foundry is now processing through six annealing furnaces the work previously handled by 12 units. This is accomplished by the use of insulating brick and high temperature insulation.

Machining — One automobile parts manufacturer cut machining time by better than half by incorporating air brakes as clamping power in a large number of jigs and fixtures. Four 29/32-in. holes are drilled in a cast steel pressure pad, 1½ x 5 x 7 in. The casting is slid into a fixture from one side; two adjusting screws take up on one side, while two Allen set screws hold the casting on the opposite side. An air brake cylinder is mounted on the back of the fixture. Setup in this type holder needs half the time usually required by manual clamping.

Mechanized production for the automobile industry is greatly aided by the special machine tool industry. An excellent example is the 13-station transfer type machine which last year went into production on the unique water and intake manifolds for the Kettering engine. Weighing 89,000 lbs and occupying 369 x 128 in. of floor space, this multistation machine expedites manifold production by hydraulic transfer, locating and clamping means. Another special machine tool for facing cylinder block assemblies at high production rate is also in operation. This tool finishes the transmission joint face square with the crankshaft bore at the rate of 56 per hour. Production costs are reduced and output per man-hour increased because parts are handled in multiples by a transfer mechanism, three blocks being faced simultaneously. Since work moves through the machine on a conveyor with the help of automatic power transfer mechanisms, operators are relieved of all lifting. Locating and clamping is also automatic.

Joining—Welding, brazing and other methods of joining metal are seeing their full share of improvements. A special multiple spot welder, for example, produces 80 automobile dash panels per hour, utilizing 2 ultraspeed units, 2 water-cooled transformers and 76 hydraulically operated welding guns. Consisting of a suitable die holder, dies and necessary locators for positioning work parts, the carriage unit moves in and out of the welding position by means of an integrally mounted hydraulic cylinder. Parts are loaded and positioned by clamps. During the actual welding, 4 welds are made at one time and upon completion of the cycle, the fixture moves out of the machine and the operator removes the assembly.

Simplified product designs, resulting in reduced manufacturing time, savings of materials and lower costs, are reported to result from electric furnace brazing. Numerous redesigned parts are now made from inexpensive stampings, tubing and screw machine parts, typical examples of which are parts for gas stoves, automobiles, airplanes and refrigerators. At one stove company, a furnace-brazed burner is now assembled from 5 stampings and 3 screw machine parts with copper wires preplaced at the joints to serve as brazing metal. Burners are made by modern production line methods. With weight reduced 3½ lbs, savings are realized in both freight and material costs.

In another plant, carbide tool tips are brazed 500 per cent faster since the installation of a 2-stage induction heating unit. The machine enables an operator to place a setup in one of its 2 fixtures while induction heat is applied to the other. By alterna-

Fig. 3—Left, simultaneous check of 11 critical dimensions and determination of one of 5 skirt diameter classifications of diesel pistons are accomplished on this flexible multiple-inspection instrument. Sheffield Corp. photo

Fig. 4—Right, a Zerk fitting is used on this injection machine to introduce wax under pressure into dies; this is a critical step in precision investment casting process. Allis-Chalmers photo

ing between the two stations, one operator brazes in 2 hours the same number of carbide tips formerly produced in a full day's work. Brazing a carbide tip to a ½-in. turning tool, for example, formerly required 2 minutes. The same job is now done in 10 seconds.

Surface Treatment—Some of the most interesting production shortcuts can be found in various surface treatments. Electrolytic polishing of stainless steels is developing very rapidly, because of its unique adaptability for economically finishing certain classes of work too complex or too costly to polish by mechanical means. Using relatively simple basic equipment, one electroplater produces a bright, lasting finish on more than 65 different types of products including automotive hardware, household utensils, plumbing fittings, ornamental fixtures and dental instruments. Electroplating magnesium is now possible using a special process which deposits a thin film of zinc. Plating materials such as chromium, silver, gold, copper, brass, cadmium or zinc can be electrodeposited on any commercial magnesium alloy to promote good adhesion and continuous deposits. An extremely adherent thin zinc film on the surface of the magnesium is deposited by the bath which follows.

Inspection and Testing—Engineers at one automobile company have developed a device for measuring the level of molten metal in a cupola by coupling gamma rays given off by a radioisotope with a sensitive radiation detector. Located at opposite ends of a diameter are 2 vertical slide rails outside the cupola. One of these rails carries a small amount of a gamma-emitting radioisotope while the other supports a Geiger-Muller counter. Percentage of radiation reaching the counter changes as the 2 units are raised and lowered simultaneously. If the rays must pass trough the metal (which absorbs a high percentage of them) fewer rays reach the counter; gas above the metal, on the other hand, permits many rays to get through. By noting the height at which the counter indication changes, level of the cupola is easily determined.

Speed in analyzing alloys was marked last year by the first successful application of the mass-spectrometer to metals. This development permitted the completion in a few minutes of an analytical job that ordinarily would take days by chemical means. The instrument's use was made possible by vaporizing metal samples in a small filament-type furnace.

Elsewhere in quality control programs, one company makes rapid on-the-spot analyses of a varied assortment of ferrous and nonferrous materials without transporting the samples to permanently located laboratories. An analytical department on wheels is equipped to conduct specialized chemical and spectroscopic and standard physical tests. By this mobile laboratory, services of the chemical department are more closely integrated with production demands.

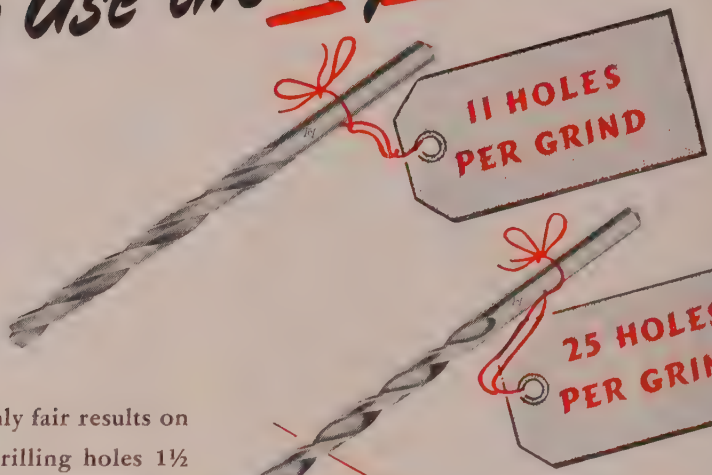
The coming year will undoubtedly see improvements in conventional gaging systems. In addition, there will be more departures from ordinary measuring techniques. In some cases, in order to meet high speed production requirements, automatic quality control devices will eliminate the human element entirely, and will involve the use of electronics, x-rays, air flow, optical instruments and photography. For instance, development of sleeve-type bearings and bushings, with greater load carrying capacity and longer life, has established a need for sensitive instruments to measure the output torque on test stands to determine comparative life of the bearings. One device uses compressed air to measure both torque and thrust.

Typical of automatic gaging trends is a flexible multiple-inspection instrument which checks 11 critical dimensions and determines 1 of 5 skirt diameter classifications of diesel pistons. By interchanging gaging points and locating cups, any of 13 different pistons within 3¼ to 4¾-in. diameter group are accurately checked and classified. Changing from red to white, a master light shows the operator whether all dimensions are within specified tolerance limits.

Materials Handling & Plant Service—Plant services are undergoing constant scrutiny to improve them for constantly-mounting production demands. Air conveyors or so-called "blowpipe" systems have been standard practice in woodworking plants for quite a few years, but application of these principles to the handling of metal chips is of rather recent origin. In the production milling department of an appliance manufacturer, over 2 tons of cast iron chips a day were being gathered by broom and truck. Today, a pneumatic chip conveyor collects these chips as fast as they are made at the cutters and carries them through ducts to collectors outside the plant, where they are discharged into storage bins.

By using a synchronized conveying system, one company heat treats ball bearing race rings on a continuous basis. Rings are carried in wire baskets at hand level from the screw machines to heat treating furnaces by overhead conveyor. A basket of machined rings can be switched off easily to the furnace loading platform. After rings are loaded on the furnace belt, no additional handling is required until they emerge, ready for finish grinding.

It Pays to Use the Right Drill



A midwestern plant was getting only fair results on a difficult machining operation—drilling holes 1½ inches deep in a stainless steel link pin at 2,125 r.p.m. A *Cleveland* Service Representative was called in. He studied the job carefully, and recommended a CLE-FORGE High Speed Drill that was especially designed for this type of work. Result: Number of holes per grind was *more than doubled*. Both were stock drills; both priced the same. But what a difference in performance! Perhaps a *Cleveland* Service Representative can be equally helpful to *you*. Get in touch with our nearest Stockroom, or . . .

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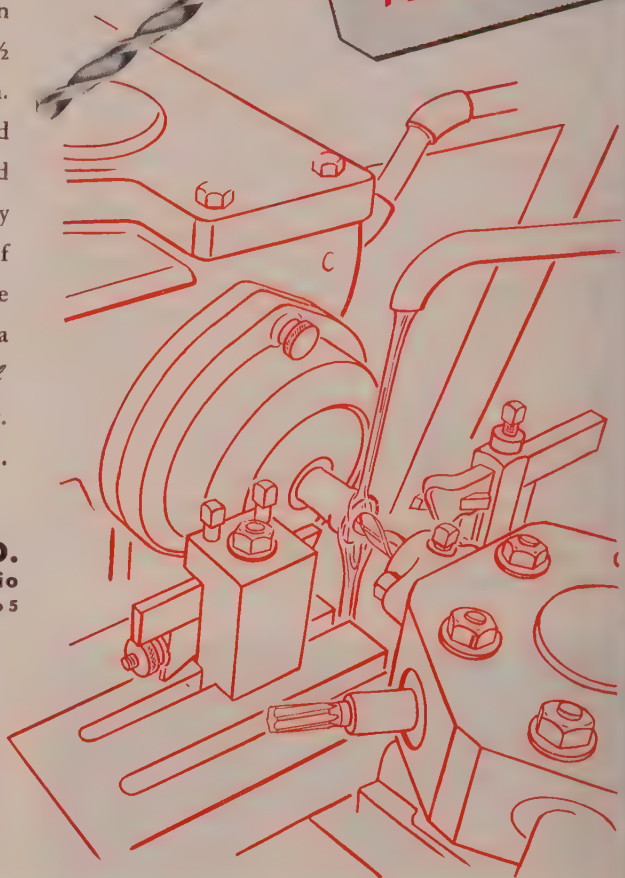

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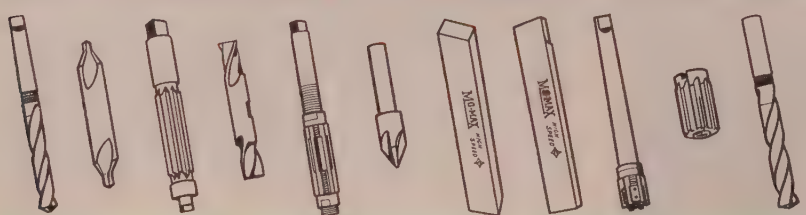

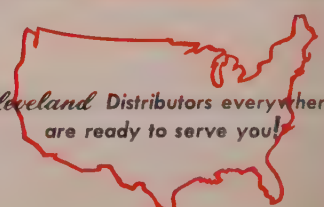

1949

Annual Forum on

Technical Progress in Metalworking

Aircraft alloys intensify research . . . More "tailor-made" irons to be used . . . Latest forging methods slash costs . . . Aluminum welding expanded by new process . . . Non-destructive testing part of production line . . . Equipment makers concentrate on "automaticity" . . . Low-temperature enamels portend new finishing era . . . Automatic flame hardening to "save" skilled operators . . . Better handling methods to be demanded . . . 2000-ton blast furnace imminent . . . Buyers select machines for own needs—not other fellow's

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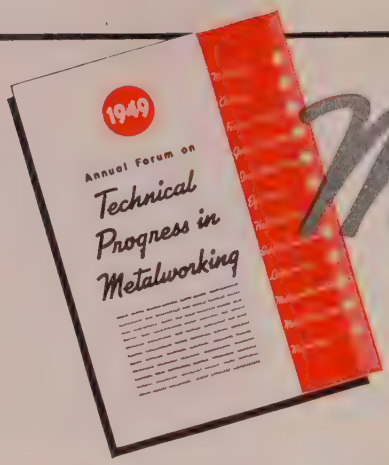


Metallurgy

Piping in short supply shackles power industry . . . Expansion in magnesium technology expected . . . New slant on acid pickling may change practices . . . Demand for corrosion-resistant metals grows . . . Aircraft alloys create new field of research

Better Understanding Needed Of Basic Physics of Metals

ARTHUR E. FOCKE

Chief metallurgist, Diamond Chain Co. Inc., Indianapolis: "It seems difficult this year to single out any one phase of metallurgy or one trend of development which is receiving more attention than another. Each of us seems to be busy with his own problems and to be trying to understand and apply to their solution some of the information developed during the war.

"The writer feels that the great interest shown at Philadelphia in the ASM symposium on the cold working of metals, confirming as it did the similar interest expressed in the fracture of metals symposium held in Chicago the year before, means that many of us realize that our ability to solve our production metallurgical problems depends very largely on our ability to develop a better understanding of the basic physics of metals.

"To those of us concerned with how metals act in service, there is still too wide a gap between what we learn from the usual laboratory tests, how metals look under the microscope, what the stress analyst talks about, and what actually happens to our product. Bridging this gap is one of our most important tasks if we are to continue to advance."

Short Supply of Piping Shackles Power Industry

A. E. WHITE

Director, engineering research institute, University of Michigan, Ann Arbor, Mich.: "During the past several years, I have confined much of my metallurgical work to the power plant field. There is no field which is undergoing a greater expansion. Although needs of this industry are not great from a tonnage standpoint, they are of extreme importance because, without metallurgical materials, it is not possible to operate a power plant.

"Owing to the increased price of coal, every effort is being made by the power interests to produce power at the lowest possible cost. To bring this about, many plants are operating at 950°, 1000° and a few even at 1050°F in place of 750°, 800°, 850°, 900°, or 925°F. Temperatures such as these mean that much of the metal is in use at a red heat for months at a time. This condition requires use of alloy steel, much of it in the form of piping. Because of the large demand for piping for all purposes, deliveries for this class of material are sometimes not available for 18 months or more. This, coupled with the time required to get turbines, makes it impossible for many of the power interests to get new plants into operation as quickly as they would like to do. This lag places an economic hardship on rapid expansion of the power industry in this country.

"Also, the possible failure of piping systems in power plants due to graphitization is still receiving considerable attention. In a number of stations, use of a solution treatment has been employed for the restoration of graphitized welds. Although it is not expected that the solution treatment will permanently prevent the combined carbon in the steel from returning to the graphitic state, it is hoped that it will restore the useful life of the piping systems in which graphitization has occurred for approximately another 50,000 or more hours."

Great Expansion Expected In Magnesium Technology

CHARLES E. NELSON

Technical director, Magnesium Division, Dow Chemical Co., Midland, Mich.: "Outstanding possibilities for great expansion in magnesium technology and use are exemplified by three new developments still in pilot plant stages:

1. Cast iron can be improved by treating with about 1 per cent magnesium to where it shows completely nodular graphite structure and properties as-cast of 6-8 per cent elongation and 80,000 to 120,000 pounds per square inch tensile strength.

2. Dry cell batteries wherein magnesium alloys are the anode, have been made and tested sufficiently to indicate greater current capacities and higher potentials than common cells.

3. Magnesium's characteristics of lightness, and hardness along with clean and rapid etching are the basic factors leading to the expanding technology of use in the printing industry. Whole pages of newspapers have been printed direct from one sheet of magnesium alloy.

"Interest in procuring structural shapes and castings of magnesium alloys for commercial highway vehicles is steadily increasing. This trend is progressing at a rate proportional to the rate at which the transportation industry is measuring the actual cost to it of unnecessary

ead weight. Several hundred all-magnesium truck odies are now being operated by the industry. These re proving that with the proper engineering practices sed, magnesium saves about 50 per cent in body weight vith large increase in strength and general ruggedness as ndicated in accident reports. Magnesium wheels are lso being developed for military and commercial heavy ehicle use. Here, over 50 per cent weight savings are

New Slant on Acid Pickling May Change Practices

CARL A. ZAPFFE

Metallurgist, Baltimore: "At the 1948 annual meeting of the Wire Association in October in Pittsburgh a new era in the acid pickling of steels was probably initiated with the disclosure in a technical session of an astonishing deficiency in all commercial grades of acid pickling inhibitors, and with a preliminary announcement of a new corrected reagent developed by the technicians of the American Chemical Paint Co.

"The story exemplifies the error in jumping at 'obvious' conclusions. Acid attacks metal and produces hydrogen gas, some of which diffuses into the metal. Inhibitors added to the acid greatly decrease metal attack and the quantity of hydrogen produced; and a seemingly logical conclusion, and the one heretofore unanimously drawn by the inhibitor industry, is that much less hydrogen therefore diffuses into the metal.

"To the marked contrary, experiment now demonstrates the existence of some subtle surface factor which actually often causes more hydrogen to dissolve into the metal from acid with inhibitor present than from raw acid. True, inhibitors greatly decrease the total amount of hydrogen produced; but they also greatly increase the proportion of that gas which is absorbed by the metal. This is particularly outstanding for stainless steel, which differs so widely from unalloyed steel in this respect that reagents are warranted specially designed for pickling stainless steel, to prevent brittleness and cracking in the hardenable grades, and blisters in strip.

"Such a reagent is Rodine 250—now available for pickling hydrogen-sensitive steels, alloyed and unalloyed like. It is the only commercial reagent so far known which will importantly improve the condition of hydrogen absorption by stainless steel over that caused by pickling in raw acid."

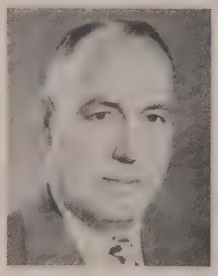
Knowledge of Metals Behavior Key to Improved Formability

MAXWELL GENSAMER

Carnegie-Illinois Steel Corp., Pittsburgh: "Technical progress in metalworking recently has been characterized by the development of a scientific point of view that has been lacking to a high degree in the past. Efforts are being made to explain the performance of metals in forming operations, in terms of their fundamental mechanical properties. One of the difficult problems is understanding the behavior of metals when subjected to combinations of forces in several directions. It was recently shown that in forming a bulge by oil pressure, stretching a sheet clamped over a circular orifice, the stress-strain curve obtained agrees very well with the stress-strain curve obtained in simple tension, when the variation with direction of the tensile properties is taken into account.

"This is a step forward in understanding forming operations in terms of simple mechanical properties. The stress-strain curves referred to are the so-called 'true stress-strain curves,' for which the stress is calculated for the actual area and not the original area as for the conventional curve, and the strain is the logarithmic strain; further, under combined stresses, as in the bulge, appropriate functions of the principal stresses and strains are used instead of the ordinary stress and strain.

"The problem of 'necking down' in 2-dimensional stretching is now well understood, as far as understanding when necking down should begin; but the conditions determining the distribution of deformation and the point of fracture are more elusive. Despite considerable thought and experimentation, it is still not possible to predict with certainty, from theoretical considerations and laboratory measurements, just how much deformation can be withstood without fracture in a forming operation. On this account considerable effort has been expended in developing laboratory testing methods that correlate well with forming performance, even though the reasons for the correlation may not be evident. The value of this approach is expected to be apparent when such tests are proved to be really indicative of performance; they will then provide the basis for laboratory experiments that may confidently be expected to lead to metals of improved formability."



Advantages of H Steels Gaining Recognition of Users

J. K. KILLMER

Metallurgical engineer, Bethlehem Steel Co., Bethlehem, Pa.: "Hardenability bands for 70 'H' steels already have been published, bands for nine more are in the process of publication and data for 31 are being accumulated. The task of gathering data and establishing the limits for the bands of the various grades of constructional alloy steels has been a co-operative effort by appropriate committees of the Society of Automotive Engineers and the American Iron and Steel Institute.

"The publication of 'H' bands with chemical limits and detailed explanations has provided steel users with information for ordering the proper grades to supply their needs. They have not hurried in availing themselves of the opportunity but recent surveys have shown a growing tendency to do so.

"The number of users is increasing because of a recognition of the advantages to be gained from 'H' steels as compared to steels supplied to chemical and grain size limits only. These are: Ease of selecting the proper 'H' steel for a given part; economies possible in selecting the least expensive 'H' steel of the required hardenability; elimination of occasional heats that will not harden sufficiently, and conversely, of occasional heats that yield a high percentage of cracked parts; ability (when a certain accustomed grade is not available) to pick a satisfactory substitute intelligently.

"Other advantages cited by users of 'H' steels have

been: Less distortion, fewer variations in heat treating procedure, and reduced rejections.

"As a general rule, the reaction of the users of 'H' steels has been favorable".

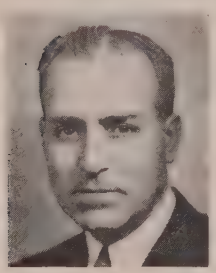
Hardenability Specifications Real Metallurgical Advances

C. L. McCUEN

General manager, research laboratories division, General Motors Corp., Detroit: "During the past year great progress has been made in the art of precision casting as exemplified by production demands of accurate torque converter castings, blades for gas turbines and similar parts. Highly accurate castings for these purposes are being made on a production basis and require but little in finishing operations. It is certain that from the successes already achieved in this direction progress in the future should be rapid.

"In the field of metallurgy, one of the important accomplishments of the year has been a general acceptance of hardenability specifications for the selection and purchase of steels. The best alloy steel for a machine member may now be selected more intelligently because the hardenability test shows exactly how much alloy is needed for each application. In addition, it provides the steelmakers with increased latitude in the fabrication of steel beyond that provided under chemical specification.

"For the past year an important cooperative program in the automobile industry has been underway to establish standards of surface roughness. The program has proceeded to a point where it is expected that early in 1949 these new standard surface roughness blocks will be available generally."



Hardness of Castings Controlled During Production

J. MANUELE

Director, headquarters quality control dept., Westinghouse Electric Corp., East Pittsburgh, Pa.: "Quality control methods are applicable to foundry operations in the same manner that they have been used in parts manufacturing and on bench operations. Such methods have been found particularly effective for controlling the hardness of gray iron castings for improving machinability. In the foundry, a simple hardness test is made on a specially designed test bar. From this test, carbon and silicon content and temperature are regulated to maintain a brinell hardness number of the test bar below a predetermined value. This assures the machine shop receiving castings which can be machined at high speeds without the necessity of annealing them.

"It is well known that under some conditions of pouring temperature and chemical composition, mass cementite and pearlitic structure will occur in the thin sections of small gray iron castings. This will cause difficulty in machining, especially on high speed operations. The difficulty is made apparent in the rapid wear of tools, and in some cases, sudden tool failure.

"It was found that the machine shop could machine all castings not harder than 195 brinell hardness number and statistical investigation showed that this corresponded to an average brinell hardness of 170 in the specially cast test bar. Therefore, the procedure was developed to pour these special test bars and test them in a portable hardness testing machine. The hardness numbers thus obtained were converted to brinell for posting on a conventional control chart. Pouring temperature was also measured and posted on a separate control chart. These two charts formed the basis for controlling machinability.

"If hardness of the test blocks climbed above 185 BHN, silicon inoculations were made to the iron. These inoculants were generally added in the ladle or in a holding furnace. If the temperature dropped below 2550°F, steps were taken to secure hotter iron.

"By means of these control charts machinability is maintained without recourse to annealing. Advantage of this method of controlling quality is that all tests are made in the foundry where it is possible to take corrective action."

Heat-Resistant Alloys Present Many Problems

C. A. CRAWFORD

Development and Research Div., International Nickel Co. Inc., New York: "Heat resistant alloys for use in aircraft engines continue to present many unsolved problems. Sheet metal forms for both exhaust systems of piston engines and combustion systems for gas turbines are being made either of high nickel-chromium alloys or nickel-chromium-iron alloys, with or without silicon additions. In special cases, some of the newer and more highly priced nickel-chromium-iron alloys that have been hardened with combinations of molybdenum, tungsten, columbium and titanium, and also some alloys containing cobalt, are in use under trial in prototype models.

"Trend is to put more and more emphasis on design with efforts being made to provide greater temperature uniformity and surface cooling. This trend looks toward the eventual use of more simple alloys of lower cost both in dollars and in the less plentiful metals. The same general trend is likewise true for such components as rotors, blades and vanes for aircraft gas turbines. Currently, the cobalt-chromium-nickel cast alloys continue to be used at the higher temperatures followed by age hardened nickel-chromium or nickel-cobalt-chromium alloys where the temperature is lower. For work below 1200°F, iron base nickel-chromium alloys can be used.

Sees Growing Demand for Corrosion-Resistant Metals

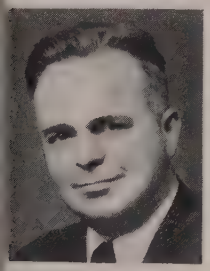
HAROLD J. ROAST

Consulting chemist and metallurgist, Montreal, Canada: "Increasing progress in chemical engineering and the production of an ever growing volume of chemical products including plastics and insecticide sprays, has made, and will continue to make, demand for metal products for containers, bearings, and machines generally that will resist corrosion.

"If corrosion were the only requisite, the problem would be simpler, but with anticorrosive properties must go strength, rigidity, elasticity and other constants. Dissimilar metals in an electrolyte lead to corrosion and even differences in worked metal of the same composi-

ion due to varying strains have been found to favor f not actually set up electrolytic attack.

"Castings, because of their homogeneity, are coming increasingly into favor in this fight against corrosion and to an ever increasing extent one of the many cast bronzes will be found to answer the chemical engineer's requirements."



Aircraft Alloys Create New Field of Research

R. H. HARRINGTON

Research metallurgist, General Electric Co., Schenectady, N. Y.: "Steel dominated metallurgical research in 1948 just as the giant dominated Jack's beanstalk. The austenitic transformation ever remains at least a partial mystery, being the subject of considerable investigation in plain carbon and alloy steels, inclusive of isothermal treatments and dimensional stability. Cast steels were also emphasized with reference to inclusions, density variations and mechanical porperties.

"Special topical reports of research included properties of metals in materials engineering, grain growth in industrial metallurgy, metallurgy and magnetism, diffusion and surface phenomena, plastic deformation, and mechanism and phenomena of precipitation.

"Nonferrous research included the notch sensitivity of magnesium alloys, effect of grain size on the mechanical properties of deep drawing brass, copper-silver and copper-iron alloys for special communications cable, grain growth in aluminum-magnesium and aluminum-manganese alloys, the effect of single addition metals on the properties of pure aluminum and the solubility of iron in solid aluminum.

"Stratospheric flight of planes, rockets, and projectiles has initiated a new field of research concerning the effect of very low temperatures on the mechanical properties of 'aircraft' alloys. It is also interesting to note that, as the direct result of research, two new materials have just appeared on the market: (a) A new zinc base alloy containing copper and beryllium and (b), ductile titanium."

Selection of Materials Now Under Constant Review

T. L. COUNIHAN

Chief metallurgist, Hyatt Bearings Division, General Motors Corp., Harrison, N. J.: "During the last year or more the selection of materials has been a topic for serious consideration by metallurgists in the steel-using industries. Material scarcities, price structure upheavals and a growing appreciation of the value of hardenability information have caused many metallurgists to review material usage. Often the results of such study have been fruitful not only from a cost and procurement standpoint but from a performance standpoint as well.

"It is recognized that it is not easy to change practices of long standing. However, for reasons mentioned above there are occasions where need dictates a review of past practices. It might be well for those who have not had the necessity or occasion to review material specifications to chart such a course for 1949.

"Needless to write, one cannot select equivalent hardenability in a steel substitute and blindly apply the newly-selected material with every expectation that no further considerations are necessary. If the selection is a medium or higher carbon content steel which contains alloying elements and is to be heat treated, consideration should be given to the influence of prior microstructure. In the use of low carbon alloyed steel which is to be carburized, the susceptibility of some steels to build up high carbon concentrations during carburizing cannot be overlooked. Should the substitute steel be a radical departure from past practices, the matter of stress pattern can be important. Unfortunately, knowledge of the influence of hardenability and heat treatments on stress patterns is most limited. We do know that stress is intimately associated with part design and that every individual part has its own stress pattern.

"Exercising due caution with regard to possible pitfalls, but not letting such fears inhibit metallurgical reasoning, much may be gained by reviewing material selections and specifications."

Advancements Made in Metallurgy of Rare Metals

COLIN FINK

Head, division of electrochemistry, Columbia University, New York: "Outstanding development in metallurgy during the last few years is the advancement of metals such as titanium, zirconium, cobalt and columbium into the factory stage. There is 60 times as much titanium in the earth's crust as there is copper. New rare metal metallurgy depends on reducing agents such as magnesium, calcium and hydrogen rather than on carbon. In the past the use of carbon almost invariably meant contamination of the metal due to carbide formation—and a brittle product. There is a demand for ductile, malleable beryllium and germanism".

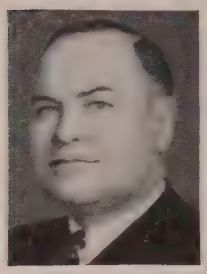
Conservation of Resources Affects Industrial Research

C. O. DOHRENWEND

Research consultant, Midwest Research Institute, Kansas City, Mo.: "Present day trend towards conservation of our natural resources and the elimination of waste from industrial operations has given rise to the viewpoint that this is the real foundation for economic stability. This fresh idea has reawakened an interest in industry that will eventually affect the activities in all aspects of our industrial life. For continued economic stability, production and sales, the life-blood of industry, must follow directions marked by sound research.

"In the light of our present industrial development, this trend can only grow and means that research will take a stronger place at the council tables instead of being restricted to the solution of physical problems whose only objective is quick profits. Rather, in the

not too distant future, industry will accept the responsibilities of solving the long range problems for continued successful operation by producing not only the maximum from the least but through research making certain that its operations are for the benefit of the most."



Malleable Iron Industry Uses More Boron

NORMAN F. TISDALE

Molybdenum Corp. of America, Pittsburgh: "Story of steel in 1948 was one of shortages and continued lengthened deliveries. 1949 seems destined to continue this trend but there likely will be some variations. Use of alloys has increased, and once again, molybdenum being a domestic alloy, has stepped into the breach caused by scarcities of other common alloys. This has resulted in increased production of molybdenum steels. New uses of molybdenum are steadily being found and this, also, is accounting for increased tonnages of molybdenum steel. Experimental molybdenum steels and irons are already being tested in tools, tool steels, rolls, rails and railroad equipment; these will likely take their place as regular production in 1949.

"Tungsten continues to be utilized in high speed and tool steels. Increased quantities of tungsten powder are finding their way into hard surfacing welding rods, sintered carbides and high temperature alloys. New demands for special steels to withstand severe service for jet propulsion are increasing the interest in the physical properties of tungsten. In the field of machining, tungsten-bearing materials still are prominent as reliable standbys for this type of work.

"Boron still moves ahead in the favor of manufacturers of ferrous materials. Greatly increased quantities of boron are finding their way into the malleable iron industry, where the element is acting as an aid to quick annealing. The use of boron in the roll industry continues at its high level, and utilization of boron in steels greatly increased this last year. A number of foundries specializing in cast steel are finding the use of boron a real economical aid to them."

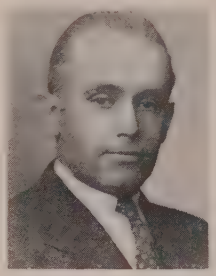
More Alloy Steel Used In Mechanical Springs

F. P. ZIMMERLI

Chief Engineer, Barnes-Gibson-Raymond, Division of Associated Spring Corp., Detroit: "The spring industry saw in 1948, a pickup in the use of alloy steel in mechanical springs due to its greater resistance to settling under moderate temperatures. Up to 300° F is possible in some of the automatic transmissions or torque converters which are, or shortly will be, in automotive use. There has been some increase in the use of Swedish valve spring wire at the expense of the domestic supply due to availability. The endurance limit of either is satisfactory but the higher manganese usually present in American steel is of advantage in settling in use.

"Considerable interest is manifested in 8660 series for the larger springs made by hot-coiled methods and using bars, not wire. Much interest in 4150, 5150 or 5160 steels stems from a desire to obtain a steel cheaper than 9260, or 9262, since the new extras were added. Just what will result is not yet clear, but a decrease in the use of silicomanganese appears probable.

"Use of steel shot for peening springs has made its appearance. The usual cast iron shot will break up and cut the springs and machines more than steel. There is an appreciable saving in machine wear with steel shot. Surface of the parts peened looks much smoother than if white cast iron is used. This may result in holding back steel shot usage because some metallurgists believe they can estimate a peening job by eye and the steel shot will not appear to advantage. The Almen strip arc height is much lower for an equal endurance life when steel is substituted for white cast iron shot. This interferes with some drawings calling for an arc height which will necessitate using a white iron shot irrespective of how the endurance limits of the two materials might line up. To really sum up peening efficiency we have to date only an endurance run on which to rely at present."



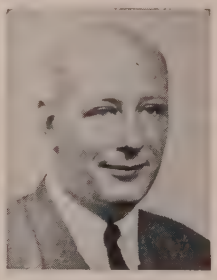
Seeks Wider Applications Of Permanent Magnets

E. E. GEORGE

Engineer, metallurgy division, chemical department, General Electric Co., Pittsfield, Mass.: "The trend in metallurgical products manufactured in the plastics division is toward more applications of permanent magnets as well as the introduction of new metallurgical products to industry.

"The announcement of sintered Alnico 5 last year is typical of the new developments on which we are working.

"Television has found advantages of using permanent magnets in their designs. This market is growing daily and includes such items as: Ion traps, focus coils, deflection yokes, loud speaker magnets; and in combination sets, phonograph pick-ups containing the new sintered Alnico 5."

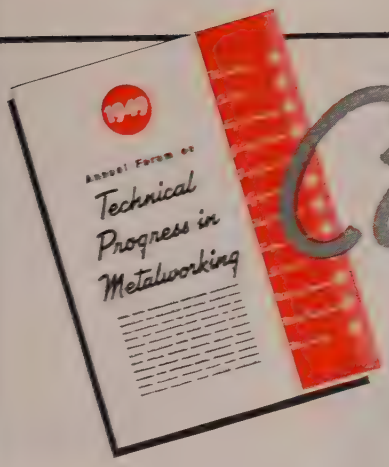


This Year To Challenge Ingenuity of Metallurgist

ARNOLD P. SEASHOLTZ

Registered professional engineer, Seasholtz Metallurgical Service, Lancaster, Pa.: "Nineteen forty-nine will challenge the ingenuity of the metallurgist. Changes in specifications and processing will be required to maintain quality control because of material procurement problems. A few of the problems facing us in the coming year are: F.O.B. pricing might cause a change in source of material, scarcity of some raw materials, rising prices of some nonferrous materials, substitution of materials to meet delivery dates, quality control to meet competitive market, inconsistency of quality of materials, new developments in possible armament program.

"Thermal treatment of material is an essential procedure to adapt it to processing and maintain quality. Heat treating is no longer an art but a science."



Casting

High-temperature alloys create casting problems . . . Pig iron shortage alters melting procedures . . . Demand for "tailor-made" irons increases . . . Latest sand reclaiming techniques reduce need of new materials . . . Die casting alloy compositions controlled closely

Research on Feeding of Steel Castings Proving Fruitful

CHARLES W. BRIGGS

Technical and research director, Steel Founders' Society of America, Cleveland: "The steel casting industry has made considerable strides in its collective work on product development during the ast year. Much progress has been made in the use of eel castings in cast-weld construction and composite brication. Also progress is being recorded in the substitution of steel castings for weldments and forgings. his latter has been accomplished by a program of education concerning the economical advantages of the use steel castings in all types of fabrication. The technical and operating developments made during and since e war years, together with a greater mechanized industry, has enabled the steel casting industry to extend the vantages of the use of steel castings from both the ality and economic points of view.

"Technical activities of the steel casting industry have en many and varied during the past year. Research udies on the feeding of steel castings have been responble for increased efficiencies. It is now possible for eel foundrymen to calculate the riser dimensions for any production castings so that higher yield ratios of stings shipped to castings produced can be obtained. lso the industry has closely followed the developments the use of exothermic piping compounds and charts ve been prepared on production basis of the time and nount of material to be added to risers in order to obin the most effective results in the feeding of steel stings.

"The industry has been much concerned during the st year with reducing the time of pattern production d in developing ways and means of lowering pattern sts. A number of excellent suggestions have been deloped in the industry, such as the use of plastic patrns and time-saving devices which have been most lpful. Also, mechanized equipment of the industry has en very carefully studied and a survey published as to aintenance methods and the means whereby maintenace costs can be reduced.

"A number of studies have been made during the year the weldability of cast steels. The industry is, of urse, much interested in the relation of the weldability cast steels as compared to that of rolled steels. Battle Memorial Institute's studies showed that from the standpoint of weldability cast steels are similar to wrought steels providing that their compositions and heat treatments are similar. In fact it was shown that the degree of underbead cracking in cast steels under conditions of slow bend testing was less than in comparable grades of wrought steels.

"Further research studies have been made by our society on the surface finish of steel castings. Grain size classifications of molds, the use of various types of mold wash, and metal penetration have all been carefully investigated."

Die Casting Industry Continues To Grow

CHAS. PACK

Vice president, Doehler-Jarvis Corp., New York: "It was believed that the die casting industry had hit an all time high during the war, but the records indicate that the sales of die castings have increased steadily every year since the end of the war. This steady growth of the die casting industry should continue during 1949 providing there is an ample supply of basic raw materials, particularly high grade zinc and aluminum. Present indications are that the supply of these materials will be ample to keep the die casting industry going unless there is an increase in government stockpiling or in the government defense program."

New Cast Steel Truck Designs Increase Freight Car Speeds

FRANK X. HORN

Assistant works manager and chief metallurgist, Scullin Steel Co., St. Louis: "Among the recent developments in steel castings is the improved freight car truck.

"We are all aware of the vital part railroads play in the life of the nation in normal times. In times such as the present, with shortages of raw materials, equipment, and man power, and with the necessity for rapid, efficient transportation, their job, in the face of shortages of their own, amounts to a challenge.

"How the steel casting industry is helping to meet

this challenge is perhaps not so well known.

"To the average person watching a freight car passing by, the trucks bouncing and rolling along on their four wheels seem not to have changed much in design from what they always have been. Yet nothing could be farther from the truth.

"The cast steel truck manufacturers spend endless amounts of time and money in research trying to develop a freight truck which will perfectly carry the weight of the car, cushioning any and all shocks and jolts.

"Within the past few years several cast steel truck designs have been introduced which are said to approach the ultimate truck and which, according to actual performance tests, have the following characteristics:

"Cushioning and controlling lateral and vertical motion, resulting in improved riding qualities, which substantially decrease lading damage and increase the service life of freight cars and road beds. Also improved tracking characteristics permit increased freight car speeds from the usual 60 up to 90 miles per hour."

High-Temperature Alloys Present Casting Problems

JOHN W. JUPPENLATZ

Chief metallurgist, Lebanon Steel Foundry, Lebanon, Pa.: "Advancement of mechanical procedures has resulted in high speed production of molds with a minimum of labor which has been accomplished through highly mechanized rapid production of mold components. At present this high speed molding equipment is confined to the smaller casting sizes, and due to its cost of installation, can only be applied to large production runs such as may be encountered by the automotive industry. Since the quantities produced per man hour are great, some of the savings realized will be ultimately reflected to the benefit of the consumer.

"Methods of centrifugally casting steel and alloys have been improved recently to permit the production of higher quality castings with greater density. Circular and tubular components for the production of jet engines are now being made using modified principles of centrifuging, depositing molten metal in the mold, which is solidified under high pressure so that the resulting product has high density and excellent structural properties.

"Development work is continuing on the production of high melting point steel and alloy castings utilizing permanent molds refractory coated and cast either statically or under pressure. These results indicate that limited practices and procedures can be achieved, and we will probably hear more about these developments in the future.

"Demands for engineering castings to serve at higher temperatures are constantly increasing and some of the more highly alloyed compositions are finding favor with industry. These newer types of alloys are metallurgical advancements that have presented the foundry with new production problems often requiring the highest degree of casting integrity and soundness. These unusual castings are usually subjected to all modes of non-destructive testing such as x-ray, magnetic particle testing, fluorescent inspection, and even the supersonics. Nondestructive testing methods in today's foundry are becoming well accepted, better understood, and have resulted in greater casting soundness that permits a higher level of engineering confidence.

"Future trends of the steel and alloy casting industry indicate the need for refinements of process and refractory materials that will withstand the very high temperatures encountered during pouring. Some of the most recent refractory developments have brought forth ceramic materials that are substantially inert to multiple types of molten metal and their related oxides."

Sand Reclaiming Advances To Cut Need for New Materials

JOHN HOWE HALL

Consultant, Swarthmore, Pa.: "An outstanding contribution last year was the progress made in sand reclaiming. Several large scale installations are being made in steel foundries that are intended to restore used sand to the condition of new sand, by a combination of wet and dry cleaning; and continued research is being carried out under the auspices of the Steel Founders' Society of America with a view to determining the fundamental principles of sand reclaiming. It is not too much to say that within the next few years, a large reduction in the consumption of new sand per ton of castings will be attained.

"Published results on the effect, or otherwise, of initial grain size of cast steel upon the properties of the finished castings, have attracted considerable attention, and should be most helpful to the steel foundryman in promoting the sale of his product."

Pig Iron Shortage Alters Melting Procedures

JAMES H. LANSING

Technical and research director Malleable Founders' Society Cleveland: "Last year's pig iron shortages, especially in the case of direct air furnace melters, necessitated conducting melting operations with but half the amount of pig iron normally used. To replace the unavailable pig iron, increased amounts of malleable and steel scrap were used. It was necessary for malleable producers in the New England states, New York and eastern Pennsylvania, to make use of pig iron from Belgium, France, Germany and other European countries because of the several months shutdown of the Mystic blast furnace for repairs.

"In general, direct air furnace malleable melters were compelled to allow more time for melting and to use silvery pig, silicospiegel and carbon-raisers in the charges. These were supplemented by additions of ferrosilicon, ferromanganese and petroleum coke or other carbon raisers, following a preliminary analysis and prior to tapping the heats.

"One company, having substantial amounts of light steel scrap available from its manufacturing operations regularly melted this material in a small cupola, producing a home-made pig iron.

"Precautions of longer melting periods, more prelim-

ry analyses and alloy additions produced quality met- which compared favorably with that produced in nor- operation. In some cases its graphitization rate or nealability was reduced to some extent but this was et by increases in annealing cycles. The main ef- ts on direct air furnace melting were, some decrease production, and some increases in foundry scrap, fuel, refractory consumption. These factors combined th the increased amounts of ferroalloys and carbon sers required, as well as the higher cost of foreign g iron, caused a general increase in production costs.

"While the amount of pig used in duplex operations s reduced, the maintenance of sufficient carbon con- t was generally no problem. Preliminary cupola melt- with the metal in direct contact with the fuel, sup- ed an adequate carbon content.

"Changes in duplex operation were, however, mainly e to the lack of adequate supplies of good metallurgical e. Inferior cokes which broke up easily and, in some es, anthracite coal were used to augment the de- ased fuel supply. Generally higher cupola coke beds re required and an increase in the coke consumption r ton of iron melted. Higher sulphur content of the l made for a higher sulphur metal, requiring greater e of desulphurizers and increases in manganese content.

"Also of disadvantage to duplex melters has been ap scarcity, especially in steel grades free from chro- m. Some use has been made of boron in offsetting e effect of chromium, but this must be in small, care- y controlled amounts as otherwise the physical prop- es of the final product are adversely affected."

Material Shortages Force Better Foundry Control

R. G. McELWEE

Manager, Iron Foundry Div., Vanadium Corp. of America, Detroit: "It is refreshing and typical of the spirit of the foundry metallurgical group that in the face of material shortages and substitutions, progress is being made in many shops in meeting even tough- specifications. Offsetting their material difficulties with more and better supervision and research is paying dividends for those with the courage and organizations to study the possibilities of better controls.

"There is more interest in control mechanisms than when materials were plentiful and the lessons learned in using them will be of permanent benefit in gray iron."

Pronounced Drift Toward Die Castings Seen

A. D. WEIGOUT

Precision Castings Co. Inc., Cleveland: "Ever since the scarcity of steel and good cast iron became serious, there has been a pronounced drift towards die castings for applications formerly made in cast iron and also many stampings made of steel. This was done not only for reasons of necessity but also in many cases it was found to be more economical after the changeover was made.

"We therefore find many interesting developments of such applications, with the result that the industry is becoming more and more diversified, entering new lines of endeavor, all of which is to the good as far as the die casting industry is concerned. How far this can be carried and how successfully this trend towards die castings will develop will depend on the availability of aluminum, which is also becoming scarce. The tight situation on aluminum today is a matter of general knowledge and may eventually prove to be the stop signal for any further advance in this direction. Government allocations, if they should materialize, may or may not clarify this."

Suggests Scientific Approach To Foundry Operations

H. A. SCHWARTZ

Manager of research, National Malleable and Steel Castings Co., Cleveland: "Probably the two points of greatest practical interest in the foundry business have been the production of a spheruliti- cast iron by the use of cerium as an alloying element, which was accomplished by Morrogh and his associates at the British Cast Iron Research Institute and the development of a continuous billet casting process by Republic Steel Co. and Babcock and Wilcox Co.

"A matter of greater import than either, however, is, in the writer's opinion, the increasing trend in the foundry business to develop the technical and scientific aspects of operating problems. This manifests itself quite strongly in an increase in well prepared papers before the AFA and similar organizations, dealing with the fundamentals of foundry processes.

"Another evidence of the same trend is the support of instructions in foundry engineering, principally by the AFA and in part, in individual organizations in a number of the technical schools of the country. The foundry industry will hold its place in the world only if it uses scientific and technological information as completely as, for example, the electrical engineering industry does."

Light Metal Alloy Shortage Slows Die Casting Industry

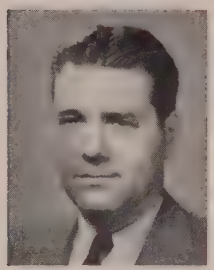
HOWARD M. HUBBARD

President, Hydraulic Press Mfg. Co., Mount Gilead, O.: "The critical supply of sheet metal is the biggest single factor affecting the hydraulic press business. Two notable exceptions, both inherent to hydraulic press designs, have helped the sale of hydraulic presses in this period, viz. the ability of the hydraulic press to draw irregular shapes with minimum rejects, and the fact that dies can be interchanged quickly—a big factor in stamping plants today where short runs are necessary. There has been active interest in hydraulic presses which will draw sheet metal to greater depths thus reducing the number of drawing operations and at the same time reducing the cost of additional dies, presses and manpower. Single draws with reductions in blank size of over 50 per cent have been developed for hydraulic presses.

"Die casting machines, especially high-pressure 'cold

chamber' machines for casting aluminum alloys have been active. This interest is basically due to savings in production costs of intricate castings over other methods. Although the die casting industry has grown rapidly in recent years with over a thousand plants now engaged in this pressure casting process, die casting machine shipments have been seriously affected by the present shortage of light metal alloys.

"Recent developments and improvements in molding materials, plus the fact that molding materials are plentiful, open up a large potential untapped market of molding machines."



Composition of Die Casting Alloys Closely Controlled

R. W. DIVELY

Metallurgist, The Hoover Co., North Canton, 0.: "The die casting industry has had another heavy production year. With new machines going into production, by both old and new producers, the industry has seen a tremendous expansion in volume. These machines are of the cold chamber type and are capable of manufacturing die castings of the best quality. A large number of new applications are being adapted to die castings by development work through the engineering staffs of many companies. These applications are largely in making parts developed for new products and parts made previously by another process.

"From a metallurgical standpoint it is very important to control the composition of the alloy used in die castings. This is especially true where zinc die castings are being produced. The anaylsis must be held within the specification requirements of lead, tin and cadmium, to control intergranular corrosion. This corrosion is accelerated by increasing amounts of these elements in the alloy. All manufacturers of zinc die castings should control the alloy by the spectographic method.

"From all evidence, the die casting industry will continue to have a successful year in 1949. There appears to be no receding of volume of business at the present time."

Increased Demand for "Tailor-Made" Irons Seen

O. SMALLEY

President, Meehanite Metal Corp., New Rochelle, N. Y.: "The foundry in general has shown some falling off in demand for castings during the past year but a trend in the reverse direction is in evidence again. Demand for irons with definite engineering specifications is tending to increase, however, and much of the business is directed to specialty products and the use of 'tailor made' irons in new developments.

"Undoubtedly the most disturbing factors relate to the increased difficulty of obtaining raw materials both with regard to quantity and quality. This renders the need for clearly defined technological control of melting practice and foundry procedures of even more vital significance.

"Meehanite foundries have found increasing appreciation by the design engineer of the large amount of property data available on these products. Along with such basic properties as modulus of elasticity, yield strength and high temperature creep properties, experimental stress analysis has now become a regular tool in design with such castings. Literature is also available on formulas for computing maximum stresses and deflections in flat plates and for similar computations in angles and ribbed plates.

"These facts are simply part of the recent rapid development in materials engineering whereby efforts are being directed to sound design and a reduction on the 'factors of ignorance.' Unquestionably one of the important factors in 1949 will be concerned with proper material selection and application rather than spectacular developments of new alloys."

Sees Improvement in Physical Conditions of Foundries

H. S. WASHBURN

President, Plainville Casting Co., Plainville, Conn.: "Outstanding development among the gray iron foundries since the end of World War II is in the improvement being made in the physical condition of our foundries. Installation of materials handling equipment, improvements in general housekeeping, use of light reflecting paints and the study given to better artificial lighting and ventilation are certainly making the foundry a better place in which to work.

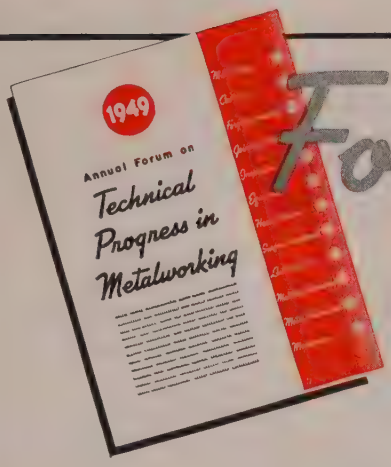
"To devote our entire production facilities to the production of materials for fighting a war is unthinkable but should such an emergency again arise, I believe that the advances made and continuing to be made in labor saving equipment, and in creating better working conditions, will enable this industry to serve our government even better than in the last war."

Many Foundries Look to Hot Blast Equipment

A. W. GREGG

Consulting engineer, Whitin Corp., Harvey, Ill.: "During the year, iron foundries in most districts have experienced serious trouble due to the inferior quality of coke which is coupled with prices at an all time high. Because of difficulty in obtaining metal temperatures sufficient to pour castings having thin sections, several foundries have installed small electric furnaces to super-heat metal from the cupola.

"Also because of coke trouble, there has been an increasing interest in hot blast operation. Because of its cost, hot blast equipment has been limited in the past to foundries melting large tonnages. At present prices for coke, foundries melting more modest tonnages can justify the installation of hot blast equipment. Independently fired blast heaters are less expensive than the well-known Griffin system, which uses waste gases from the cupola as fuel. This equipment is of interest to the smaller foundries."



Forging and Forming

New forging methods slash costs . . . Perfection of automatic presses emphasized . . . Forge shop vibration reduced drastically . . . Low alloy high tensile steels gain in favor . . . Use of heavy walled seamless tubing increases

Drop Forging Producers Improve Operating Efficiencies

C. H. SMITH

President, Steel Improvement & Forge Co., Cleveland: "Continued demands for civilian products coupled with requirements of the national defense program will give the manufacturers of drop forgings an opportunity to continue the fight to improve operating efficiencies. This attempt to cut down costs is being pushed forward on several fronts. First, new equipment with basic changes in design features of hammers and other forging equipment is coming on the market together with new models of previously proved designs.

"Some paring of cost can be realized by utilizing the higher production possibilities of these new machines. Second, real progress is being made in the field of lengthening die life through the medium of reducing scale on the forged billets, improved die steels, better die lubricants and greater control of die polishing techniques.

"Increased aircraft program presents a new challenge to the forging industry to work to closer tolerances and to more intricate shapes. Design engineers in both engine and airframe plants are continually presenting the producers with more difficult parts to produce."

Forge Shop Vibration Drastically Reduced

WALDEMAR NAUJOKS

Girard Associates, Philadelphia: "Important trend among the more progressive production forging plants, seeking to reduce their operating costs by improvements in shop techniques and methods of processing, has been the departure from the age-old belief that it is necessary to endure smoke, noise, vibration, and dirty working conditions in the making of production forgings. Extreme hammer and press vibration, a source of trouble in plant equipment maintenance and of fatigue to shop workers, is being eliminated completely by new and modern vibration isolation methods.

"Hammer and press forging equipment can now be placed beside precision production tools. The smoke and scale caused by the older types of forge heating furnaces is being eliminated by modern, well designed heating units which have a high heating efficiency and minimum of scale and smoke. Hammer and equipment noises are being reduced by proper screening and sound insulating methods. Suitable ventilation designs and good housekeeping are used to make shop conditions more attractive.

"Elimination of forge shop vibration, reduction in shop noises, and practically no shop gases and smoke are major factors in reducing maintenance costs and improving shop conditions to reduce worker fatigue. Basic result has been improvement in manhour efficiency, one of the important factors in these days of high labor costs."

New Hot and Cold Forging Methods Slash Costs

J. H. FRIEDMAN

Vice president, National Machinery Co., Tiffin, O.: "Great strides have been made recently in the hot and cold forging fields; existing machines and methods have been outmoded and new applications for present methods and machines perfected. Production and material costs have been slashed.

"In hot forging, two developments are of interest. One is an auxiliary attachment for our type press which preforms blanks by rolling them into the variable forms required for forging. It has been applied to numerous jobs with excellent success. Scrap loss is reduced, production increased, and die life enhanced. The other development is a compact, versatile rolling machine which is used in conjunction with forging presses, hammers and forging machines. It preforms blanks free of shuts and folds, substituting fast, unskilled operations for costly edging and fullering.

"Hot and cold forging machines also have been combined on a number of jobs with excellent results. For example, a cold header and a pair of our presses were teamed to produce a truck wheel nut. On the basis of an 8-hour day, one cold header (part time) and two presses (full time) saved steel at the rate of 2,500,000 pounds annually over the second best method used to produce these nuts. Also production was increased.

"Latest cold nut formers using wire or coiled rod are producing a wide variety of nut blanks ranging in size up to 1⅛-inch SAE. Outputs range from 40 to 100 nut blanks per minute, depending on size. Single and double-chamfered nuts of high strength and quality now can be cold forged economically, and such 'specials' as washer faced, high and jam nuts, cone, hug lock and castellated nuts can at last be made very satisfactorily.

"Improved tubular rivet headers, many of which are now in production, make tubular rivets from solid wire

and the rivets are pierced on the header. Due to the elimination of drilling there is considerable saving in material and machining time. The work is of excellent quality—the head being central and well filled, and the pierced end square. Either tapered or straight hole rivets can be made equally well and in a large range of hold depths. Life of tools, including piercers, is good."

Sees Emphasis on Perfection Of Automatic Presses

D. C. VERSON

President, Verson Allsteel Press Co., Chicago.: "Necessity for cutting costs and at the same time increasing production in the metal forming industry has led us to place the greatest emphasis on perfecting fully automatic presses in the very large and heavy sizes. We have proved by study, experiment and practical application that it is possible, through the use of one high production automatic press to eliminate an entire line of six to ten presses each performing a single operation. We have succeeded in applying this principle to the mass production of not only concentric parts, but of rectangular and nonconcentric parts as well.

"Meaning of this is readily apparent. One operator instead of six or ten as the case may be, elimination of annealing and pickling steps in drawing and redrawing operations, substantial savings in scrap, great savings in floor space, maintenance of one machine only and the problem of moving the material from press to floor to press is banished."

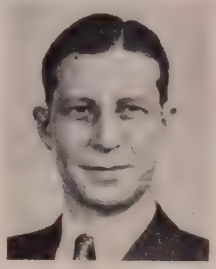
Use of Heavy Walled Seamless Tubing Increases

W. G. BISCHOFF

Metallurgical engineer, Timken Roller Bearing Co., Canton, O.: "Steel users, finding themselves faced with increasing costs for both labor and materials in the manufacture of their products are surveying their raw materials and manufacturing processes more critically than ever before with the idea of effecting savings which will permit them to remain competitive in their respective markets. One contribution of the steel industry toward helping customers is in the application of seamless mechanical tubing instead of solid bar stock for jobs when the economies of using this product justify the adoption of tubing.

"Relatively light wall seamless tubing has been used for a number of years with exceptional success; however, the large diameter heavy wall tubing is just beginning to find its place in the market and its use is expected to increase rapidly. Good examples of progress along these lines are to be found in the oil field equipment industry where the use of tubing eliminates expensive drilling and boring of long lengths of bar stock. During World War II use of heavy wall seamless tubing for gun barrels was well established. Other examples would include most fabricating problems where an excessive amount of unusable metal must be removed from the center portion of solid bar stock by expensive machining operations.

"Many steels of special analysis and properties as well as all common engineering steels can be produced as seamless tubing. Physical properties obtained after proper heat treatment compare equally to and in some cases better than those obtained on similar types and sizes of steel in bar form."



Low Alloy High Tensile Steels Gain in Favor

C. L. ALTENBURGER

Research Engineer, alloy div., Great Lakes Steel Corp., Detroit: "We note an increasing trend in the use of low alloy high tensile steels because of the ever greater recognition of their capacity to resist corrosion in connection with their greater strength. Real monetary savings are being attained because of the weight savings possible, resulting in more parts per ton and the possibilities inherent in reduced transportation costs. In several cases these savings more than pay for their initial cost within 5 years.

"Great skill is being attained in forming and drawing these harder steels. Stampings are being made from them which would have been considered impossible a few years ago. In some cases they are drawn into shapes which cannot be exceeded by the very soft drawing steels.

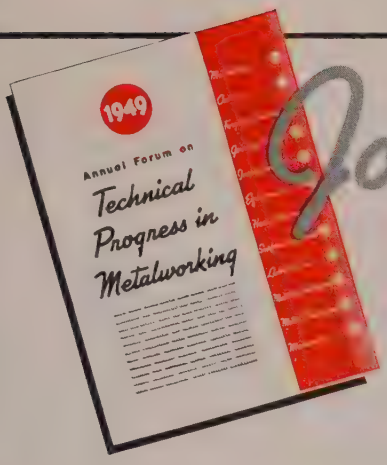
"The same remarks are applicable to other processes used in fabrication, such as welding and brazing. This trend, we think, is important to the national welfare because of the resulting conservation of materials which cannot be replaced once they have been consumed."

Modern Mechanical Presses Now Precision Production Tool

JOHN F. HERKENHOFF

Minster Machine Co., Minster, O.: "Higher manufacturing costs have brought about the increased use and development of metal stampings to reduce unit costs and at the same time maintain, or improve the quality of the finished product. Ingenious and revolutionary stamping designs have resulted. Highly accurate and expensive dies used to produce these stampings require precision press equipment, built to modern machine tool standards. However, weighing the costs of mechanical power press equipment against the possible high productiveness and the cost of tooling, it is false economy for a stamping producer to continue using inaccurate and unsafe press equipment with the highly precision dies that are being made today.

"Along with the greater use of stamped products, there has been the same proportionate increase in demand for mechanical power presses. With increased volume, press manufacturers have been able not alone to offer better designs, but to change manufacturing practices through greater use of jigs and fixtures, with the result that the presses can be operated more economically, with greater accuracy and with a lower maintenance cost. These improvements in manufacturing practices resulted in better shaft finishes, closer bearing tolerances and a higher degree of overall accuracy than was ever possible before and is so necessary in press operations today."



Joining and Welding

Nondestructive testing improves welding efficiency . . . Vital need felt for resistance welding training . . . AC welders provide 33 per cent savings in power costs . . . Aluminum welding expanded by new process . . . Industrial range of gas cutting expanded

Inert Gas-Shielded Arc Welding in Wider Use

H. A. HUFF, JR.
Welding specialist, technical sales division, Air Reduction Sales Co., New York: "1948 was a year of steady and expanding progress in welding, particularly in the inert-gas-shielded arc welding field. This process, rapidly coming into wider use, was aided by several refinements and improved facilities. Introduction of specially-designed alternating current transformers which not only yield a balanced alternating current, but also provide a satisfactorily stable alternating current arc without the inherent difficulties of high-frequency current, makes the process both simpler and more reliable. Interest is also exhibited in the possibilities of high purity helium as a shielding gas for welding aluminum.

"Such developments, coupled with improved methods and techniques emerging from production installations, are helping to maintain the strong trend toward wider use of inert gas shielded arc welding process."

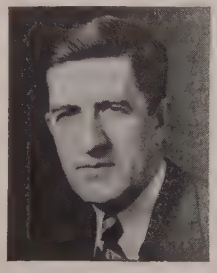
Influence of Alloying Elements Important in Welding

J. HEUSCHKEL
Manager, welding section, research laboratories, Westinghouse Electric Corp., East Pittsburgh, Pa.: "Welding trends in 1948 were marked by shifts in emphasis, rather than by revolutionary new developments. For example, there was increased interest in the inert gas shielded arc process. This is not a new process. Availability of the inert gases at reduced prices, improved equipment and wider knowledge of benefits caused increased activity in this field.

"Continued steel shortages have resulted in increased incentives to secure variable analyses materials for welded applications. This in turn has required that the influence of the various alloying elements in addition to the carbon contents in steel upon the performance of the welded joints be closely studied. From these studies it is now possible to evaluate the probable performance of a given analysis of known temper. Welded performance, for a given welding and stress condition first increases and then sharply decreases with continuous additions of carbon and total alloy contents.

"Power shortages have accelerated the shift to three-phase power sources for resistance welding. Promulgation of welding schedules involving only slightly longer current application times with little if any detectable effect upon over-all welding speed has also served to reduce power demands.

"The growing complexity of the many welding problems has further brought out the lack of adequate training in the existing engineering educational curricula. It is noteworthy that only one engineering college has recognized this subject as equal to other engineering subjects and provides the necessary training."



More Wave Shape Knowledge May Improve Welding Results

G. W. GARMAN
Control Divisions, General Electric Co., Schenectady, N. Y.: "From a historical viewpoint, there have been many interesting and noteworthy developments in the field of resistance welding since its invention by Elihu Thomson. Some of the more noteworthy dates are its invention in 1886, commercial introduction of electronic control about 1930, and the extensive commercial development of stored energy welding in 1942. Early evidence also indicates that 1948 may be one of the more noteworthy years, not so much because of new inventions, but because of increased knowledge of old principles which were put to greater use.

"It has been recognized that improved results can sometimes be obtained by using a constant welding current with an increasing electrode force cycle. This method has the objection that the time constant of such a cycle is difficult to control. It is also known that the rate of current application affects welding results.

"Most recent investigations this year indicate the importance of this characteristic, which has led to the development of a so-called 'slope control' for single-phase welding. This control, when used with electronic control, which includes heat adjustment by the phase shift method, permits the welding current to start from a relatively low value and to increase, at a predetermined rate, to a final value suitable for welding. Preliminary tests show that electrode tip life is materially increased in the welding of aluminum alloys, particularly for the

strong alloys such as 24 ST. These data also indicate that there is less spitting with improved weld quality in some projection welding.

"Also of importance has been the development of the all-electronic type three-phase frequency changer with its increased reliability and accuracy. These advantages, together with the reduction in kva demand, indicate increased use of this type of equipment.

"Development of a metallic rectifier capable of passing the thousands of amperes as required for direct current resistance welding is also of importance. This method of welding, like that of the frequency changer, also results in lower kva demand, and power is taken from a three-phase source.

"One common point of importance with all of these developments is the lengthened electrode tip life with improved welding results when welding some aluminum alloys. Evidence so far indicates that the rate of current rise, which is inherently slow with three-phase equipment, is the important factor. With the frequency changer and the metallic rectifier systems, the time constant of the current rise depends upon the circuit constants and is not readily adjustable as may be required for the welding of different materials of different thicknesses. The slope control is capable of adjustment as may be required for these materials."

Sees Vital Need for Resistance Welding Training

JOHN D. GORDON

General manager, Progressive Welder Co., Detroit: "If any further proof were needed that resistance welding is at last coming into its own in industry, 1948 furnished that proof. Following on the heels of a record-breaking 1947, in which five times as much resistance welding equipment was delivered to industry as in any of the years just prior to the war, 1948 proved that this was no accident.

"Nevertheless, much remains to be done before these extremely fast and low cost fabricating processes—spot welding, projection welding, seam welding, flash welding—can do their full share in increasing productivity per man and machine hour, reduce costs, and improve quality of products to the extent of which they are capable.

"According to the recent statement of a leading welding engineer in the automotive industry—cradle of resistance welding in this country—not only are there many parts still fabricated by other processes which should be resistance welded, but 'less than 10 per cent of the automotive parts being resistance welded today are actually designed for resistance welding.'

"Much of the job of providing the required education for designers will of necessity devolve upon the resistance welding industry itself. So far, only a bare start has been made in technical colleges and schools to provide courses in designing for resistance welding, and such schools as are attempting to enter this field are badly handicapped. There is not available today a single practical reference or text book on the subject.

"Again, while many technical publications touch on the subject of resistance welding, there is not a single publication in this country which serves the needs of those who are looking for real information on these processes and the design elements necessary to the full use of resistance welding.

"Under the circumstances, it is quite remarkable that resistance welding has undergone such a tremendous expansion in use. A recent survey shows that approximately 30 per cent of all metal working plants of any size in the nation are already using resistance welding in some form or other. Of course, outside of two or three industries the extent of utilization is small, but the start has been made."

Expansion Program Reflects Demand for Fasteners

GEORGE A. TINNERMAN

Vice president and general manager, Tinnerman Products Inc., Cleveland: "Positive proof that more and more manufacturers are using increasing numbers of our type fasteners is shown in our production figures for 1948. For the first time in our history, annual production of these units in modified forms soared well over the one billion mark. With the intensified marketing program we have scheduled for this year, the past record should be surpassed easily.

"Perhaps the most important single development that is influencing our plans for 1949 is our new nut retainer device. A box-like clip made of spring steel, it holds a square nut in place for the assembly of two sheet metal panels. Two opposing prongs snap into a square hole in one panel and hold the nut in bolt receiving position, thereby eliminating the need for welding, staking or clinching.

"Indications are that this development will immediately require expansion of our production facilities. We shall shortly begin the addition of approximately 16,000 square feet of manufacturing space for this and other production operations.

"The metalworking industry has long needed an economical nut retainer of this type and we expect many manufacturers to make it an important part of their cost-reducing program during the coming year."

Education Immediate Problem Of Arc Welding Industry

A. F. DAVIS

Vice president, Lincoln Electric Co., Cleveland: "One of the most immediate problems facing manufacturers of arc welding equipment today is that of education. Although the arc welding industry has grown phenomenally, no industry, no one company can stand still simply skimming off the cream. We all go either forward or backward.

"In two fields especially, arc welding has a tremendous opportunity to show how it can be put to the task of producing better products at less cost. They are the construction field and the machine tool industry. Engineers in these fields, by a fruitful combination of creative thinking in design and imagination in execution have demonstrated that arc welded bridges, buildings, milling machines, broaches, lathes, etc., embody new concepts of economy, performance and beauty.

"Immediate problem of the arc welding industry, as well as the steel making industry, is to encourage and aid the development of this trend. We must assure that thinking in this direction is not simply along th

ies of imitating what has been done in the past, but at designing is done from the ground up with the idea mind that welding will be the means of fabrication.. ir responsibility is to give the designer steel, steel apes and tools that are themselves designed to do the ost efficient welding job possible."

33% Savings in Power Cost Possible with AC Welders

C. P. CROCO

Manager, arc welding department, Westinghouse Electric Corp., Buffalo: "The recent increased use of alternating current welding over direct current welding is attributed to three chief advantages the alternating current welding namely: Absence of c blow, less power, and lower maintenance costs.

"Absence of arc blow results in better welds at a ster speed. This not only reduces the cost of welding t, at the same time, it makes the job of welding easier.

"Higher efficiency of the alternating current welder, ghty-five to ninety-five per cent, as compared to fifty- e to sixty-five per cent for direct current welders, eans a saving in power cost of at least one third. wer no-load loss, together with higher efficiency, eans that savings of as high as 285 dollars a year can made by replacing a 300-ampere direct current welder th an alternating current welder.

"Considerable yearly savings in maintenance can be alized by the use of an alternating current welder over comparable direct current unit due to the absence of ating parts and commutators.

"The swing is toward alternating current welding and great increase in its use can be expected as more ople find out about the enormous savings that can be ade. One large shipbuilding concern which formerly ed all direct current equipment has purchased over 400 ernating current welders to be used in their yards. e next year will find everyone looking for means of ducing their costs and one of the best ways to do this ll be by replacing old inefficient direct current welders th new highly efficient alternating current welders, nich can pay for themselves in from 16 months to two ars from savings alone."

Low-Degree of Weld Porosity By Inert-Gas Arc Welding

H. T. HERBST

Development engineer, Linde Air Products Co., New York: "The inert gas-shielded arc welding process has, in the past few years, become well-established as a production tool in the fabrication of aluminum, magnesium, silicon bronze and many other nonferrous materials. In the ferrous welding field results have not been as uniformly successful although the process was readily accepted on its many merits for the welding of stainless steel and other high alloys.

"Welding of low-carbon mild steel was, for a long time, not acceptable because of serious porosity problems. The porosity was known to be associated mainly with the rimmed types of steel. This material is used extensively in mass production items requiring drawing operations as illustrated by automobile fenders and bodies, and washing machine tubs. The need for a fast, economical, easy-to-use welding method, capable of producing non-porous welds without reinforcement or spatter, was urgent. Since the inert gas arc-welding process met all of the requirements excepting that of freedom from porosity a concentrated effort was made to correct this condition.

"During the past year this effort resulted in the establishment of suitable filler rod and operating technique requirements which were enthusiastically received by several automobile body and fender manufacturers. Heliarc welding has become standard production practice on several car models, while the extensive use of the process on future models is being planned. In addition to fender and body sheet welding, other operations scheduled for early application are bumper guard welding and the joining of sheets for large pieces to be drawn.

"Major advantages which have now been proved through production use are excellent control of weld size and shape and a minimum of distortion, both of which result in low grinding and shaping costs."

Piping Systems Joined by Low Temperature Silver Brazing

A. M. SETAPEN

Handy & Harman, New York: "While uses of low temperature silver brazing alloys have been on a steeply rising curve since the war, the outstanding development in this connection appears to be the use of these low temperature silver brazing materials for joining piping systems. Several new types of fittings have been designed and developed for use with these brazing alloys.

"In addition to this interesting expansion in the use of brazing alloys, the automotive industry is rapidly becoming a large user of silver brazing materials."

Dry Disk Rectifier Introduced In Resistance Welding

G. N. SIEGER

President, S-M-S Corp., Detroit: "Emphasis is still being placed on the utilization of three-phase power equipment and in this field the introduction of a dry disk rectifier has created a considerable amount of interest. Then too there is a deeper appreciation of the value of preheating and the part it plays, more especially in oxidized or scaly stock. Machine developments have been completed whereby any plate up to 1 inch thick can be spot-welded with the mill scale untouched. This development is based entirely upon the value of preheating prior to welding.

"One of the most important developments of the year is in the transition of the flash welding of hardenable alloys from an art to a science. Optimum flash welding conditions are obtained by the establishment and control of temperature measurement in the machine. It is the result of the work of several scientists in one of our schools of higher education. Its commercial importance is already definitely established.

"In the practical field, we are happy to report the

greater appreciation of the value of good maintenance. Controls maintained on schedule rather than haphazard maintenance when breakdowns occur are being increasingly practiced. Appreciation for that which was heretofore considered insignificant is considered a major contribution such as a simple fact of effective water cooling of electrode dies, etc. Simple and effective tip dressers assist in making the problem of maintenance simpler."

Weldability Important In Selecting Materials

D. H. COREY

Welding engineer, Detroit-Edison Co., Detroit: "Steel requirements of the power industry can be met most satisfactorily only by the utilization of a wide variety of steels, selected on the basis of their ability to perform well under specific service conditions. Illustrative of some of the special properties required are the following: Resistance to abrasion, to erosion and corrosion, and to oxidation at high temperatures; greater strength at elevated temperatures than plain carbon steel, and the retention of desirable properties over a long service period.

"General acceptance of welding as a method of fabricating, and its extensive use in subsequent maintenance, makes weldability an important factor in the selection of materials. Frequently selection becomes a compromise between a 'best' material, not readily weldable under field conditions, and a 'not-quite-so-good', but readily weldable, material. Selection ought to result from correlating both metallurgical and welding experience.

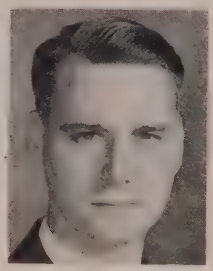
"Happily, there appears to be a more general trend, than in the past, to recognize that metallurgists and welding engineers can be mutually helpful. Metallurgists can be exceedingly helpful to the welding engineer in prescribing correct welding procedures for the various steels and in diagnosing troubles when they occur. Conversely, the welding engineer, with his knowledge of the characteristics of the various processes and filler metals, should be in a position to assist the metallurgist in the selection of materials which are not only inherently suitable but which can be fabricated and repaired by welding without undergoing serious metallurgical damage."

Industrial Range of Gas Cutting Expanded

R. F. HELMKAMP

Technical sales division, Air Reduction Sales Co., New York: "Gas cutting process has passed the point of development of basic operations, and has moved into a period of refinement of methods on one hand, and extension of the process into new fields on the other. Cutting hot materials on and off the roll line has made its appearance; special machines and methods have been developed for high-production repetitive cutting; other similar developments are on the way.

"To handle such applications, problems of gas supply and control, tracing methods, speed and cut controls, and other elements, had to be met. Electronics have appeared in speed controls, template tracers, gas controls and arrangements to keep cutting tips at a constant height from the workpiece. Remote control arrangements, automatic cycle controls, heat protection methods for equipment and operators, fume control, and fume and slag disposal methods have been developed to meet present problems and will continue to develop as new applications appear."



Notes Increased Use of Inert Gas-Shielded Arc Welding

J. R. HUNTER

Manager, welding section, Revere Copper & Brass Inc., Rome, N. Y.: "Fabrication of copper and copper-alloy weldments has been characterized by a general increase in the use of the inert gas shielded arc welding process.

"Even where sheet metal gages are involved, straight polarity direct current arc with its higher rate of work heating has found preference. The higher voltage and hotter arc obtainable with helium atmospheres makes this shielding gas the choice in the use of the process to weld the higher conductivity metals such as copper and brasses. However, with lower conductivity metals such as copper-silicon alloy and cupro-nickel, argon is preferred, particularly in manual use of the process, because open circuit voltages may be employed which make for easy establishment and maintenance of a stable arc with a reduced heating power (due to the lower arc voltages) not subject to great variation with changes in arc length.

"Applications of the process to welding of plate thicknesses of copper and copper alloys, while perhaps not as numerous, have nonetheless been attendant with success, particularly in the case of the copper-silicon alloys. Sound welds of 'code' quality have been obtained under prevailing humidity conditions which gave, or would give rise to the developments of considerable porosity in the use of the more or less standard process of pressure vessel fabrication, the carbon arc method.

"Use of preheat temperatures of 800 to 1000° F. have been necessary to successfully employ a direct current straight polarity argon-shielded arc for welding deoxidized copper plate. Best results in the fabrication of all copper weldments are obtained with a silicon deoxidized type of filler metal. While a weld quality is produced comparable to that obtained with the filler metal and oxyacetylene welding, minimization of base metal annealing is reflected in slightly higher joint strengths."

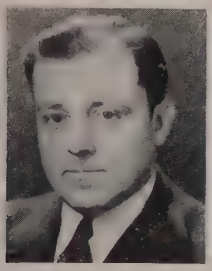
Welded Aluminum Fabrication Expanded by New Process

A. N. KUGLER

Technical sales division, Air Reduction Sales Co., New York: "Field of welded aluminum fabrication has been greatly expanded by the development of the new automatic process. This new method, welding by means of an automatic continuous-feed electrode-filler wire, with the arc in a controlled sheath of inert gas, uses very high current densities and filler wire feed-speeds. It offers increased welding speeds

and at the same time permits economical welding of heavy sections, of the order of 2 inches thickness. Its ease of operation in all positions and the simplicity of the equipment enable an operator to weld complex assemblies which would be difficult or impossible if attempted by other means.

"Success of the process depends upon the high wire feed speeds—100 to 300 inches per minute—and the high current densities—as much as twelve times those commonly employed. The process is essentially automatic, providing features in a hand tool which were heretofore available only in automatic welding. Weld speeds of 34 inches per minute have been recorded for 5/16-inch flat fillet welds; deposition efficiencies of 94 to 96 per cent have been reported."



Arc Welding Equipment Lighter and More Portable

C. I. MacGUFFIE

Manager sales, welding divisions, General Electric Co., Fitchburg, Mass.: "Arc welding equipment trends during 1948 have been pronounced toward lighter weight and more readily portable units for a given output. Motor-generator sets of half their previous weight were placed on the market in quantities. Small, light, transformer arc welders for farm and home workshop use found great acceptance. This trend should continue in the interest of providing the customer with better and more flexible equipment.

"Electrode development was accelerated by the wider use of low-hydrogen types of coatings. These coatings have assisted in eliminating cracking of deposits in the welding of many hard-to-weld alloys. Use of these coatings will continue to increase during 1949.

"Most outstanding progress in the welding industry during 1948 was made in welding aluminum and light metals through the application of inert-arc welding. Refinement of techniques and improved designs of equipment will play a large part in the continued growth of the welding industry during years to come."

Welding Efficiency Improved By Nondestructive Testing

R. B. LINCOLN

National Weld Testing Bureau, Pittsburgh Testing Laboratory, Pittsburgh: "Many processes in use at present would be difficult or impossible without welding. To reach the process' present stage of development it was necessary to avoid failures as far as possible. We owe much of the progress to quality control through qualification tests and welding inspection, and particularly to nondestructive testing.

"When radiographic inspection was first used, many feared that the added cost would hold back welding, but actually the added assurance of safety has been one of the important factors in its advancement. Trepanning and similar methods of sampling have played an important part in quality control, and I believe this method of inspection could still be more widely used to advantage."

Substantial Progress Made In Welding Aluminum

G. O. HOGLUND

Chief, welding development division, Alcoa Process Development Laboratories, Aluminum Co. of America, New Kensington, Pa.: "Welding for assembling parts made from the light metal alloys is finding wider application. In welding the aluminum alloys, particularly, substantial progress has been made. An example of this is the development of tentative ASME code regulations for unfired pressure vessels. Another new field is the use of aluminum pipe lines for carrying crude oil; one such line has been installed and is now in operation. This development required the assembly of special equipment for inert gas shielded arc welding in the field with self-contained power sources. Commercial welding practices for handling metal thicknesses up to 2½ inches are developed and are in use, thus doubling range of thickness previously used for welded parts.

"Use of the inert gas shielded arc process has grown rapidly, and more welding is now accomplished with this method than with any other single welding method. Advantages claimed for the process on aluminum and magnesium have been substantiated in practice. Further development in this field is anticipated. For example, a new method in which the filler metal is fed continuously through the gas envelope has been introduced. This method is satisfactory for welding without a flux and does not require a high frequency circuit to stabilize the arc.

The new process should reduce welding costs, since it makes possible an increase in the rate of laying down the filler metal with consequent economies in labor and shielding gas. This development is still too new to evaluate properly, but intensive work is underway to explore the properties of welds made with this method and to develop more satisfactory equipment."

Sees More Railroad, Building Construction by Welding

S. D. BAUMER

Manager, technical sales division, Air Reduction Sales Co., New York: "Rapid development of new processes and techniques in the metalworking industries, together with today's radically changed economic patterns, and the resulting changes in industrial requirements, have made technical service more important than ever and much more complex. In the welding and cutting field, particularly, the technical man is increasingly faced with the need for specialization, not only in a particular process, but sometimes in a subdivision of a process, to meet needs of the user for skilled 'know-how'.

"Depending on the availability of steel, it seems that more railroad cars will be built in the next year than ever in a single year before. Figures in *Modern Railroad* magazine for October indicate that production of cars, for the second time in 3 months, passed the ten-thousand mark in August 1948; a 1949 peak of 130,000 cars is expected this year if steel is available... In this total,

the all-welded freight car will be more in evidence than ever before.

"Welding is also increasingly important to the railroads in both fabrication and repair of parts for diesel locomotives. As thes locomotives come into steadily increasing use, multiplying the maintenance work involved, the roads are reclaiming, in large numbers, such parts as engine cylinder heads, aluminum pistons, and valves. The reclaimed parts represent sizeable savings, and in some cases, are even better than new parts. Fabricated welded parts for diesels include cabs, fuel tanks, steps, pilots, traction gear cases and many other components.

"Despite the shortage of steel materials for bridge and building construction and the limited allocations of steel to structural fabricators, there has been some notable recent progress in the application of welding in the steel construction industry.

"Previous record for maximum story height of a welded building, held for a number of years by the 23-story nurses home of the Jersey Medical Center, has now been exceeded by the new 24-story City National Bank of Houston, Tex., where several other large welded tier building and additions have been fabricated since the war by the Mosher Steel Co.

"Lehigh Structural Steel Co., pioneers in welded steel construction, have continued their use of welding since the war with a number of important building projects such as the Electronics Park development of General Electric at Syracuse, involving 5000 tons of steel, and other structures.

"In Toronto, the new Sick Children's Hospital, now under construction, is of special interest because of the use of standardized welded connections which have been tabulated for rapid selection and easy use in a "Manual of Design for Arc Welded Steel Structures" published by Air Reduction Sales Co."

Efficient Shape Utilization Extends Limited Steel Supply

J. K. GANNETT

Vice president and director of engineering, Austin Co., Cleveland: "Growing acceptance and use of welding for the structural framing of industrial plants and certain types of commercial buildings has been of direct or indirect benefit to all users of structural steel.

"More efficient utilization of shapes in welded designs has enabled many welding fabricators to make the limited tonnages allocated to them go further than they could on riveted jobs.

"While it would be impossible to calculate the exact tonnage or dollar savings resulting from the increased use of welding in structural shops since the war, recent figures show a sharp increase.

"Difficulties in obtaining heavy curved steel plate normally used in the most popular welded rigid frame cross-sections have seriously hampered the extensive use of these designs, but development of alternate rigid frames built up of lighter plate and structural shapes has given substitutes that are satisfactory, both from a production standpoint and in field erections.

"It is worth noting that in 1949—the 20th year since erection of the first welded structure built in the United States—structural welding is permitted in most of the country's larger cities."

Cost Reduced by Cold Driven Rivets

PIERRE CHAMPION

President, Champion Rivet Co., Cleveland: "Outstanding development in the use of rivets is the growing acceptance by fabricators of driving large diameter rivets cold. This is accomplished by using a pressure control on the machine riveter. Cold driven rivets completely fill the holes into which they are driven, resulting in a tighter rivet without caulking, and their use reduces the cost of riveting as this method eliminates the cost of heating including the labor of the heater and the passer. Conservative estimates show a saving of, at least, 25 per cent by driving rivets cold as compared with the conventional hot driven rivets.

"In the welding field, we believe that the more general acceptance of the low hydrogen type of electrode is the outstanding development in the art of manual welding. Ferritic, or low hydrogen electrodes were being explored towards the end of World War II for the welding of armor plate to conserve critical alloys such as chromium and nickel used in stainless electrodes that were used in armor plate welding. The low hydrogen electrode is used extensively in welding steels that heretofore were not considered weldable, such as high sulphur free machining steel, high carbon steel used for scraper blades, and railroad rails. The low hydrogen electrode has opened up a new field for manual arc welding electrodes."

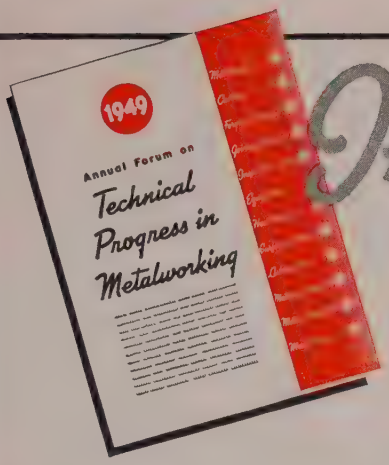
Advantages Cited for Low-Frequency Welding

C. B. STADUM

Manager, electronic control engineering, resistance welding section, Westinghouse Electric Corp., Buffalo: "Reduction of kilovolt-ampere demand of a single-phase resistance welding machine has been the desire of all concerned with this method of fabrication. A single-phase, frequency converter system is now available which makes possible a reduction in demand up to 50 per cent of the original demand. This is a result of operating the welding machine at a low frequency which in effect nullifies the high reactance of the welding machine. Power factor corrective devices are not necessary with this system.

"Welding machine operators report that low frequency welding systems such as this eliminate much of the 'spitting' at the electrodes—a result of the slow build-up of current in the work. They also report that insertion of ferromagnetic materials into the throat of the machine does not reduce the welding current as on conventional single-phase machines. They can therefore make welds of more consistent strength on a large welded assembly without using a current regulator.

"Still another reason why this will become an increasingly useful welding system is because it is inherently cheaper and simpler than any existing system which has the same advantages."



Inspection and Testing

Mechanization, inspection and high output to go hand-in-hand . . . Quality control—difference between profit and loss . . . Standardization under metric system urged . . . Nondestructive testing part of production line . . . Sees need for revising testing methods

Welding Research Aimed at New Products and Equipment

FRANK ASCHENBRENNER

Manager, apparatus research department, Air Reduction Laboratories, New York: "Function of research and development in the welding and cutting field has come into sharper focus since the first ectic postwar months have passed, and industry has ettled down to a long haul under new conditions of osts and operation, with considerably modified markets nd product goals.

"Today's research and development work must aim t new products, equipment, and processes of maximum fficiency and maximum versatility. The goal might be ummed up as a highly efficient single means of doing everal jobs very well, rather than a highly effective neans of doing a single job extremely well.

"To this end, the present day development engineer, ven in working out improvements or new uses for a ong-established and apparently satisfactory process, ften starts from the barest fundamentals, trying for impler methods which may result from a new approach. his way of attacking the job is beginning to show olidly worthwhile results, and while they are not so exiting as those in newer processes, they may in the long un be even more important to industry."

Electron Microscope Valuable In Studying Corrosion

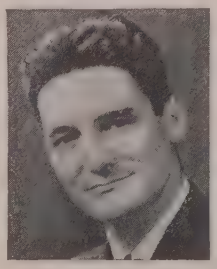
A. S. JAMESON

Supervisor, metallurgical research laboratories, International Harvester Co., Chicago: "Two important problems confronting manufacturers of trucks, tractors and farm equipment are corrosion and wear steel parts in service. These problems are often referred to the metallurgist for solution. The metallurgist as found that electron microscopy and electron and -ray diffraction can be advantageously applied to the udies of these causes of premature failure.

"It is increasingly clear that a picture of the overall ructure as determined by hardness tests and by the ght microscope does not give a true idea of the restance to wear because it does not take into account the structure and form of minute constituents. Recent work done by the electron microscope in bringing to light presence of extremely fine particles hitherto unresolved by the light microscope may contribute to a greater understanding of relationship of structure to wear.

"Invisible corrosion is closely associated with wear and is recognized as an important factor in promoting fatigue failure. Electron and x-ray diffraction methods have been applied with a great measure of success to studies of problems of corrosion. Diffraction methods enable metallurgists to follow the mechanism of corrosion through changes in crystal structure. Electron diffraction permits one to examine thin corrosion films on metal surfaces with exceedingly great precision.

"Steel and automotive industries' laboratories will find in the future increasing uses for these instruments and the methods of investigation offered by them."



Pocket-Size Roughness Scale Aids Design and Production

WARREN C. HUTCHINS

Manager, special products division, apparatus department, General Electric Co., Schenectady, N. Y.: "In the metalworking industries, the year 1948 was marked by increased use of specialized testing and measuring equipment for accelerating production and facilitating both research and maintenance. Surface roughness scales, for instance, found wide acceptance. These scales provide a pocket-size reference sample of 24 machined surfaces from 4 to 2000 microinches, grouped into 10 degrees of surface roughness. Some groups include three or four surfaces of equal roughness to illustrate differences in appearance due to different methods of machining. Each group is identified by a number which designates the roughness in microinches (average roughness). The specimens from 4 to 500 microinches are designed to conform with the proposed ASA standards.

"In addition, the scale includes specimens of 1000 and 2000 microinches (average roughness) which are not included in ASA but are useful in determining roughness of hogged and flame cut surfaces. By the use of the surface roughness scale, a mutual understanding of surface roughness is established between design and production personnel. Both the engineer and the draftsman are able to specify by symbol the degree of roughness for a particular surface. The machine operators and in-

spectors then determine by sight and feel comparison whether surfaces meet these specifications.

"The recording vibrometer was found to be a valuable aid in preventive maintenance. About the size of a small shoe box, this instrument measures and charts both vibration frequency and amplitude of a machine on a strip of wax paper. It not only indicates the need for balancing but also measures the effectiveness of balancing in reducing vibration. Its range is 10 to 120 cycles and 0.001 to 0.125-inch amplitude.

"X-ray thickness gages also came in for increased attention. These noncontacting gages give a continuous indication of the thickness of hot or cold strip while it is being rolled at high speed, permitting operators to maintain thickness within small limits. This equipment offers great savings by making possible greater yield of uniform material as well as reducing waste from off-gage rolling.

"Ball-bearing grease testers proved useful as a means of estimating the performance of a grease on a comparison basis. This equipment enables motor users to maintain lubrication more efficiently by determining how often bearings need lubrication. By sustaining conditions of test similar to those of field use, and by accelerating those conditions which contribute to lubrication breakdown, a fine comparison of greases can be made.

"Useful in research and developmental work was the electromagnetic torque meter. This instrument measures static or dynamic torque transmitted through a shaft. Cradling the prime mover or load is unnecessary. Since torque is indicated directly in pound-feet, it is possible to read torque at any time. The torque meter provides a convenient method of determining the load and efficiency of mechanisms such as pumps, motors and compressors."

Spectrographic Method Now Used To Analyze Silica Brick

P. R. IRISH

Engineer, research department, Bethlehem Steel Co., Bethlehem, Pa.: "Spectrographic analysis now is being applied to the determination of alumina in silica brick. As the result of performance studies made of silica brick, it has been well established that the alumina content is one of the important factors affecting the quality of such refractories. To assure that lots of silica brick meet the quality requirement as to alumina content and to be able to apply bricks to different applications according to their alumina content, it is necessary to analyze many silica brick samples for this compound. Further, so that shipments of brick may be stocked according to the composition of this constituent, it has become necessary to make such analyses rapidly. As routine chemical analysis was neither rapid nor accurate enough for this determination, it was necessary to devise another procedure. The spectrographic method has proven ideally suited for making such analyses.

"In spectrographic analysis brick falls in the general class of nonconducting materials. This means that the brick samples can not be used directly as electrodes to form the spark discharge as can metal tests. The usual method of placing a small amount of the sample in powdered form into a cavity in a carbon rod proved unsatisfactory for routine work. The procedure that was found to give reliable results involves fusing the brick with alkali salts. While the fusion material containing the brick sample in solution is molten, a carbon rod is dipped into the molten pool. The fused material adheres to the carbon rod, thus forming an electrode tipped with the solidified fused mass and containing all the elements of the brick in solution. The electrodes thus formed may be used in the spark source to form the spectrum of the silica from which the amount of alumina can be determined.

"Attention is being given to other impurities in silica brick such as potash and soda. The spectrographic method will probably prove to be the best method for determining the concentration of these elements in refractory material."

Trend Toward Improved Manufacturing Standards

ORLO E. BROWN

Chief metallurgist, Western Gear Works, Lynwood, Calif.: "During the past year many persons in the metal industry have been confronted with a problem which is new to production metallurgists. This is the manufacture of parts to standards or with processes still not out of the research laboratories. The condition has arisen because of the very rapid assimilation of recent developments by the industry. As a result, new progress is anticipated and parts may even be designed to include advances before such advances are worked out. Here are two examples in which results are satisfactory: Nitriding heavy cases to specified hardness gradients, and hardening large machine parts to the close dimensional tolerances usually reserved for aircraft parts.

"Problem just noted is a symptom of a trend which is noticeable throughout the automotive, aircraft, and allied industries. This is the trend toward improved standards of manufacturing. One evidence is the increase in testing materials, particularly tests which give data directly related to service requirements."

Inspection Methods To Aid Forging Output

A. O. SCHAEFER

Executive engineer, The Midvale Co., Philadelphia: "The close of World War II found the heavy forging industry better equipped than ever before. Additional large press equipment had been installed in the plants of practically all manufacturers in this field. Pent-up demand for large forgings for expansion particularly in the power and chemical industries indicate activity for several years.

"Selection of alloys for heavy forgings has never been based on the AISI-SAE tables. Forging manufacturer and purchaser generally reach agreement on a composition designed to meet the specific conditions presented. Besides the fundamental stress requirements, consideration must be given to temperature of operation, possible attack by reactive gases such as hydrogen or the hydrocarbons, other corrosive attack and even electrical characteristics. A number of alloys are emerging as at least 'commonly used' grades, although none can yet be called 'standard'.

"Large sections cannot be expected to have structural uniformity if heat treated by a method including liquid quenching. Higher mechanical properties, with fair uniformity in large sections, may possibly be obtained by increasing the alloy content to an extent permitting the attainment of the desired strength by normalizing.

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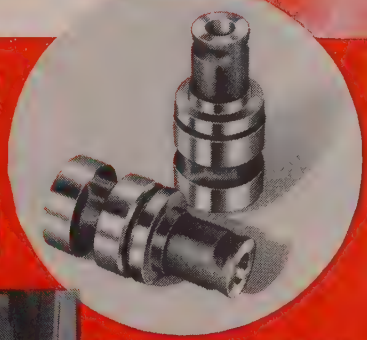
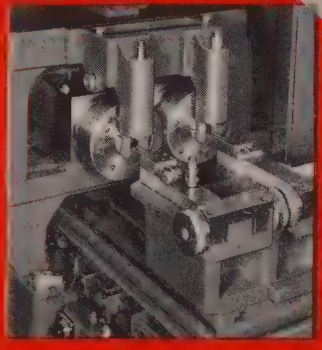


Above: Left view of Ex-Cell-O style 3112-A Precision Boring Machine arranged for automatic rough and finish boring of valve guide bushings. Parts enter chutes at left end of spindles, are fed through hollow spindle shafts to chucks, are rough and finish bored and ejected, all automatically, at the rate of 300 pieces per hour.



Above: Automotive valve guide bushings with O.D. of 1/2" and 1-3/16" long that are rough and finish bored on the machine shown above left.

Left: Close-up view of spindles and boring bar supports. Vertical cross-ways in front of chucks house locating plungers that, when lowered, limit the forward travel of the bushings. Locators are withdrawn during boring and ejecting portions of cycle. Graduated dials on boring bar supports permit accurate adjustment of boring bar to control size of hole.

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The engineering know-how that makes possible an automatic machine such as this one is always available to Ex-Cell-O customers, whether their work requires parts in short runs or great volume. Whether tolerances are measured in thousandths or ten-thousandths, Ex-Cell-O engineers will suggest the most practical and efficient method of finishing your parts. Call Ex-Cell-O today!

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need appears to exist for alloy steels of this nature.

"In the field of testing and inspection, much attention has been devoted to ultrasonic methods. At the present time it appears that this extremely sensitive method of inspection will be useful when sufficient experience has been gained to interpret the results. Large masses contain nonhomogeneities of various sorts, all of which may give indications on the ultrasonic equipment. Experience alone will develop a positive means to determine the causes of the indications noted.

"It should also be noted that the ASTM specifications for forgings have all undergone extensive revision during the past year."

Inspection and Testing Methods Need Revision

F. R. HENSEL

Vice president, P. R. Mallory & Co. Inc., Indianapolis, Ind.: "In the rapid progress of technology, inspection and testing methods need considerable revision. In numerous instances materials and parts may be subjected to outdated inspection tests which have no bearing on the actual use of the material or part. More consideration should be given to conducting tests which will indicate if the material or part will perform satisfactorily in service.

"Furnace design and a study of the effect of atmospheres on various materials have done much in the past few years to promote furnace brazing as a practical and economical method of assembly. Assemblies are now being brazed in such a manner as to entirely eliminate costly finishing operations and material wastes which were necessary in the past. There is a definite need for investigation of new types of brazing materials for joining various materials together. In some cases none of the common brazing materials is really satisfactory.

"There is a growing demand for small drop forgings forged to very close tolerances and uniformity. In some cases these close tolerances are desirable in order to eliminate costly machining operations. In other instances machining operations may still be necessary but can be performed economically and with consistent results only when the rough forgings are uniform and held within close tolerances. Suppliers of forgings must recognize this problem and take steps to meet the demands for close tolerances if they are to compete with other methods of fabrication such as precision castings."

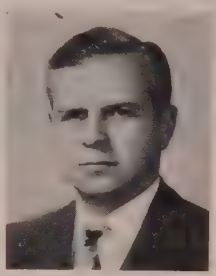
Constant Simplification Held Necessary in Metals Fields

L. H. WINKLER

Metallurgical engineer, Bethlehem Steel Co., Bethlehem, Pa.: "Standardization in both ferrous and nonferrous engineering materials has been an important factor in the development of our industrial economy. In order to keep pace with engineering progress, lists of standard steels are subject to continuing review. In the interest of our national economy, grades no longer in demand must be eliminated; some of them give way to newer grades, and many of the remaining items may be modified in order that they may better serve the end use.

"Regardless of what group of men prepares standards and specifications, they must stand the test of practical usage. Therefore, in spite of many allegations to the contrary, they cannot be established by unworthy or arbitrary action and continue to live. Moreover, as improvements are brought about by increased knowledge and advanced technique, revised standards and specifications, as well as simplification, are bound to follow.

"The emergency of World War II revealed that a comprehensive job of simplification and standardization had to be done to conserve materials, to preserve our national economy, and to assure our survival as a nation. At that time there were virtually thousands of steel compositions in use, many of these varying from one another in respect to chemical composition by amounts so small as to have no metallurgical or engineering significance. Technical committees on carbon steel bars and on alloy steels of the American Iron and Steel Institute were able to reduce this number of grades to slightly over 200, with the co-operation of the Society of Automotive Engineers, the Army Ordnance Department, the Bureau of Ships of the Navy Department, and the American Society for Testing Materials."



Mechanization, Inspection and High Output Go Hand-in-hand

LOUIS POLK

President, Sheffield Corp., Dayton, O.: "The future will likely see most high production mechanical parts completely mechanized not only in their manufacture bu also in checking their degree o interchangeability. Although requirements for precisior in production of parts are steadily increasing with tol erances unheard of a few years ago, industry is suc cessfully meeting the challenge. This has been accom plished by the introduction of new machines and de vices, with improvements in methods and design.

"For example, in some plants cylinder bores of moto cars and critical dimensions of pistons are automaticall measured for size, characteristics and classification. Thi is typical of the trend on such mass produced items a connecting rods, valves and other critical parts of moto cars, agricultural implements, trucks, tractors, refrig erators, cash registers, aircraft, etc. where fine precisio is so vital to the successful operation of the finishe product. In the case of such items as piston pins—siz classification, hardness check and finish all will be au tomatically checked at phenomenal production rates.

"Repetitive uniform measurement at the machines ar on the production line, as well as in inspection depar ments, is the prime factor in interchangeability and ma production. It is an important key to national securit as well as to the development and successful perforr ance of many new and improved products that ha created our high standard of living. Man's progre has been paced by his ability to measure in smaller a smaller units. Thanks to the progress made by indust the worker is more productive, yet much of the ha labor has been taken off his back and transferred machine tools and gaging machinery. Improvements manufacturing operations made possible by new a better machines and methods mean there will be le

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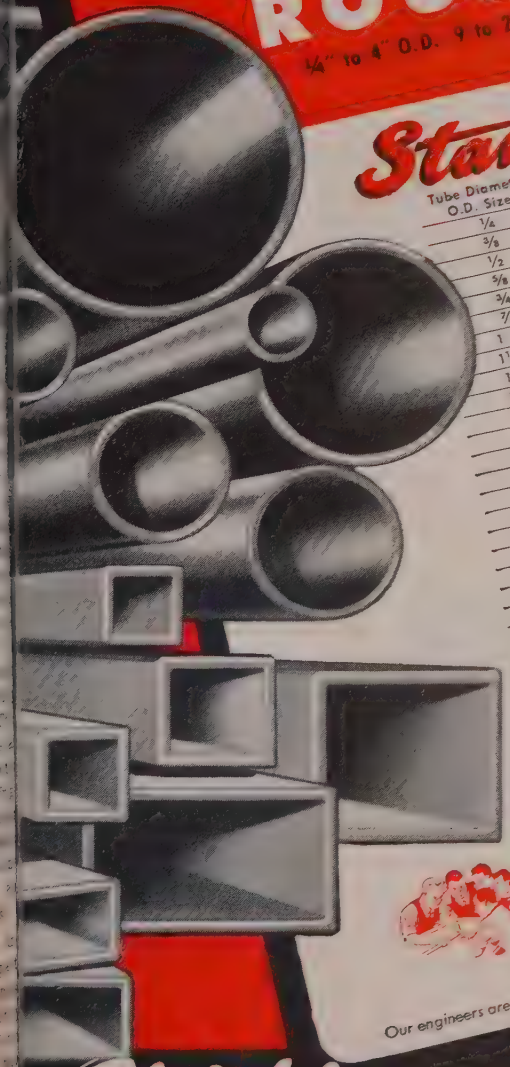
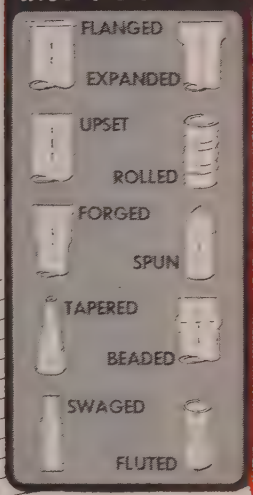


Standard Sizes

Tube Diameter O.D. Size	Maximum Wall BWG Decimal	Gauge	Minimum Wall BWG Decimal	Gauge
¼	.049	18	.028	22
⅜	.065	16	.022	24
½	.083	14	.022	24
⅝	.095	13	.022	24
¾	.095	13	.022	24
⅞	.095	13	.028	22
1	.095	13	.028	22
1⅛	.095	13	.028	22
1¼	.095	13	.028	22
1⅜	.095	11	.035	20
1½	.120	11	.035	20
1⅝	.120	11	.035	20
1¾	.120	9	.035	20
1⅞	.148	9	.035	20
2	.148	9	.035	20
2⅛	.148	11	.035	20
2¼	.120	9	.035	20
2⅜	.148	11	.035	20
2½	.120	9	.049	18
2⅝	.148	9	.049	18
2¾	.148	9	.049	18
2⅞	.148	9	.049	18
3	.148	9	.049	18
3⅛	.148	9	.049	18
3¼	.148	9	.049	16
3⅜	.148	9	.065	16
3½	.148	9	.065	16
3⅝	.148	9	.065	16
3¾	.148	9	.065	16
3⅞	.148	9		
4	.148	9		

Can be BENT also . . .



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product failure in most mechanical devices, less noise and vibration with smoother operation, as well as more economical and satisfactory performance."

Quality Control—Difference Between Profit and Loss

J. R. STEEN

Director of quality control, Sylvania Electric Products Inc., Flushing, N. Y.: "My activities concern themselves mostly with quality control including, of course, inspection and testing as well as several other important phases of the work which are becoming of ever-increasing importance in the overall quality control picture. Reference is made to operator education as one of these phases with the important realization that the cheapest and most effective kind of inspection, i.e., quality control, is that performed not by additional personnel, but by operators who assumed this obligation when accepting employment in the first place.

"Too many of us confuse the functions of inspection and quality control. Generally speaking inspection is wasteful. It is a complete loss since nothing of value is added to a product merely by inspecting it. The value must be incorporated during its actual construction. It is true, however, that defective items may be eliminated by screening. This is a procedure, however, which should be tolerated only when all other methods fail.

"On the other hand, quality control is creative. It is an artistic and a scientific means of helping everyone do his job in the best possible manner. The most important form of quality control, therefore, as well as the least expensive form, results when each productive worker realizes that he or she is the best inspector and the best quality control operator available.

"Quality control through operator education, selection and training can equal the difference between profit and loss. It can mean the difference between operator satisfaction and dissatisfaction. It can mean the difference between competitive advantage and disadvantage. It can mean the difference between pleasing the customer or having him look elsewhere to place the next order. In any event, if everyone accepts his share of the quality responsibility, everyone benefits."

Nondestructive Testing Part of Production Line

F. B. DOANE

President, Magnaflux Corp., Chicago: "The particular branch of inspection called nondestructive testing develops new and better methods, discovers new fields of application and is awarded increased acceptance by industry from year to year. In 1949 the nation's need is for still more goods and attention is thereby directed to, among other things, the device called the production line—manufacturers' tool for turning out large quantities of goods of uniform quality. Nondestructive testing is becoming a part of this line.

"In addition to furnishing a degree of assurance as to the quality of the end product, it possesses the prime economic attraction of usually being able to effect considerable savings in labor and materials. By means of such methods, parts containing defects are withdrawn from the line as early as possible so that further labor is not expended upon materials already defective.

"In looking at the various kinds of machines used for production inspection it is interesting to note the tendency of many manufacturers to purchase equipment especially designed to go directly into the line. These are often placed at several favorable stages, thus making the operations of nondestructive testing an integral and permanent part of the production process. This concept of the function of inspection is not in itself new, but its application in the use of many new and old testing procedures is playing an important part in the essential program of increasing production efficiency."

Standardization Under Metric System Urged

C. R. HELLSTROM

President, Smith & Wesson, Springfield, Mass.: "In light of present world situation the metalworking industries should examine more closely the economic feasibility of standardization. Benefits to be derived from common standards are obvious even in a domestic peacetime economy, and are a 'must' if we are to hold and expand our export markets. Some advance planning by our tool engineers could undoubtedly save our industries much of the writeoff, and any efforts now toward a decimal standard industrially or commercially would be a sound investment for the future.

"If our country is to continue as the arsenal of democracy, our industries must not only face the problems of dispersion and pilot plant production in time of war, but we should be ready to cover requirements of any peacetime defense agreement with our metric-minded allies. It is our opportunity to make a worthwhile contribution to national defense."

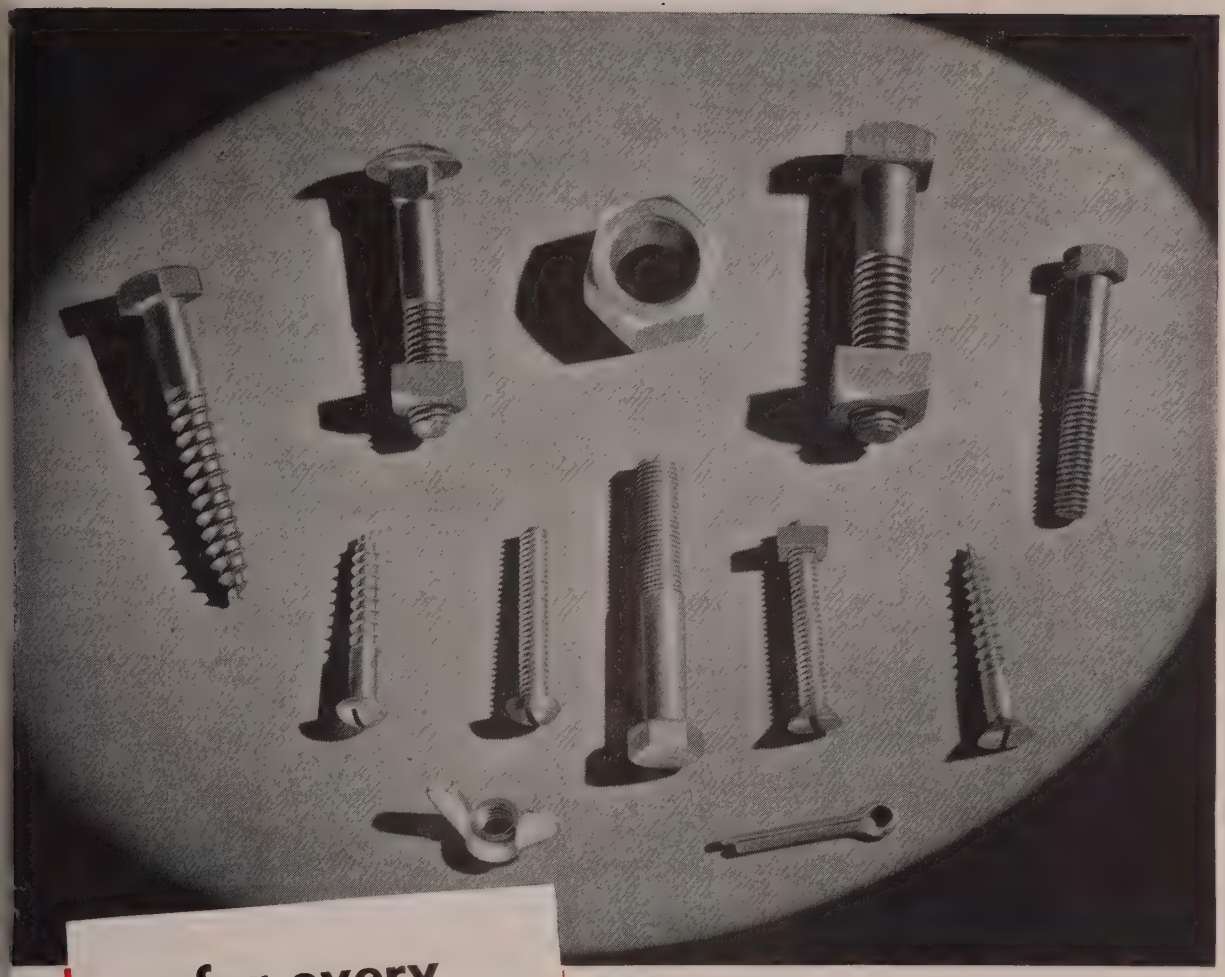
Nondestructive Testing Gaining in Popularity

W. B. COLEMAN

W. B. Coleman & Co., Philadelphia: "In the field of inspection and testing, there has been a tendency in the past several years toward nondestructive testing. X-ray, magnaflux, and the supersonic reflectoscope have been extremely helpful in this field, particularly in checking weldments, forgings, and castings for soundness.

"Improved techniques, developed during the war years, helped immeasurably in perfecting equipment for this type of testing. However, while this is satisfactory in many cases, it is also necessary to know more of the composition of the materials used in a certain application. In this case, spectrographic equipment is an invaluable aid, leading to improved technique.

"The spectrograph has been used and found to solve problems quickly and efficiently that were previously performed by long and laborious wet chemical methods. It has also been found that spectro-chemical methods, or a combination of spectrographic and chemical analysis, have solved problems that neither had been able to do singly, heretofore."



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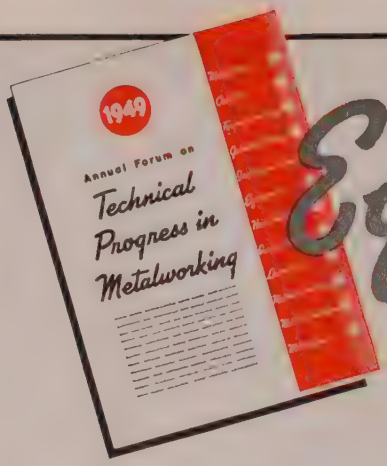

Equipment

Equipment makers concentrate on "automaticity" . . .
Electronic devices now perform functions of rheostat . . .
Generator on each stand seen for future hot strip mills . . .
Hydraulic duplicating unit slashes machining time . . .
High costs make management efficiency conscious

More Refinements in Welding And Cutting Equipment

J. K. HAMILTON

Air Reduction Laboratories, New York: "The past year has seen a steady development of improvements in several aspects of oxyacetylene welding and cutting apparatus and methods, which will begin to come into full use in the near future. Among the problems under study were the development of large size oxyacetylene burners with greater stability, simplified cooling designs and reduced maintenance problems, to make possible use of the oxyacetylene flame on jobs where it had previously been difficult or impossible. These goals have been reached, with designs now available which all but eliminate flashbacks, have simpler cooling systems and permit more efficient spacing of the flames for multiflame uses.

"Other refinements in oxyacetylene equipment include development of precision regulators for applications where exact duplication of gas flows is desired or needed, and of gas-loaded acetylene generators more responsive to line demands. Valuable refinements and improvements have also been made in manual welding, scarfing and cutting torches; and in other lines as well, the oxyacetylene processes are making steady progress."

Foreign Markets Present Special Engineering Problems

S. MENTON

General Motors Overseas Operations, Detroit: "Changing world economic and political conditions and the determination of foreign nations to develop native resources, labor and skills and the shortages of dollar exchange all tend to diminish export markets for certain American products. Many American firms long established overseas recognize the trend and are providing manufacturing facilities to augment those previously created for assembling imported components. To implement manufacturing programs, export of machinery, tools and technical know-how will be greatly accelerated.

"Individually, foreign markets are small; however, the demand is for products conforming to U.S.A. appearance and performance. Many American products lend themselves to economical overseas manufacture involving relatively simple processes that include sheet metal working and assembly, the machining of bar stock, castings, forgings, etc., rubber goods and storage batteries, to name a few.

"All present problems for low volume production. However, the fabrication of sheet metal for items of road transportation, commercial and household refrigerators and household appliances, among others, at labor hours commensurate with final selling cost of the product, have and will continue the need for developing more universal machinery and long-lived, low cost tools. To produce under these conditions will tax the ingenuity of American designing and production engineers, and many of the conventional mass production processes, machines, tools, tool materials and techniques must be discarded or modi-

"Methods, machinery, tools and tool materials used for wartime aircraft production and since neglected or discarded, offer a partial solution. Other newer developments now in the making will meet the challenge."

Equipment Manufacturers Concentrate on "Automaticity"

O. W. WINTER

President, Acme Industries Inc., Buffalo: "We are witnessing a renaissance in American production methods and tooling techniques. The term tool engineering has long since been accepted and recognized as a vital and integral factor in the manufacturing miracles we have wrought. The tool engineer, however, is today confronted with the task of reducing manufacturing costs in an increasingly competitive market for goods.

"Out of this necessity has come an intensive drive on 'automaticity.' There is little left to save in manufacturing costs other than labor. On the basis that all possible is being done with economy with materials and that overhead expenses are in keeping with efficient operation, the big and only remaining field is in the more efficient use of labor. With present day developments in electronics, hydraulics, pneumatics and mechanisms most anything can be done automatically. It remains only a problem of ingenuity and practicality. By practicality is meant not only technical but financial practicality. An automatic machine may be entirely feasible from a technical angle but maintenance or investment

osts may prove it otherwise. This calls for a thorough nalysis of all factors.

"Tried and true basic principles of automatic loading y hoppers and other devices, of automatic transfer from peration to operation and eventual automatic ejection discharge are undeniable. Combinations of operations to one unit or station, the transfer from station to tation by merry-go-round, ferris wheel or straight line ethods offers a wide latitude of practical cost reduc- on. The resultant accomplishment of 'simultation' in ne performance of a quantity of operations in a given ycle is a basic desired goal.

"Much money is being spent today on automatic as- embly. Frequently the automatic processing of parts tied in with automatic assembly resulting in a near timate in labor economy. In sheet metal operations, ne trend is definitely to progressive dies wherever pro- uction volume permits. Packaging and wrapping opera- ons offer great opportunities for cost reduction. The aste of manual effort in this field is amazing.

"An extremely important and encouraging factor in ne application and development of automatic equipment the increasing willingness of the user and hence bene- iary to go along with the builder in its development. is easy but it is not fair to expect the builder, who ust furnish all the ingenuity and resourcefulness to eate and design the machine, to build it and nurse it rough to successful performance at his entire risk and pense."

Currency Stabilization Needed To Aid Export of Equipment

ROBERT E. W. HARRISON

Mechanical Engineer, Chambersburg, Pa.: "Appreciation of American manufacturing technique in foreign countries, particularly that applying to forge and foundry, is the major incentive in these untries which prompts the buying of U. S. equipment. hortages of dollar exchange, however, is the major ob- acle, although the depreciation in their currencies, when upled with our price increases, since these foreign untries last bought American equipment, all adds up making the foreign buyers a little shy at paying for s new U. S. equipment on a basis of a ten to one in- ease in price. This, in turn, indicates the need for the tablishment of an international policy of currency sta- ization.

"Obvious need of the Western union countries for mili- ry equipment, and the manufacturing facilities to make is equipment, prompts the thought that machine tools r their arsenals should have a top priority. By pro- ding this kind of help, the U. S. strengthens their abili- to resist a take-over from the East. With the U. S. achine tool industry operating at 50 per cent of ca- city, the provison of ECA-inspired machine tool or- rs, would not only be good business, but also a wise litary precautionary move.

"In the domestic manufacturing field, there is a sig- icant increase in appreciation of the economic value of rface quality control, as a means of prolonging the luable life of mechanisms by preserving the original its of accuracy. This development, when coupled with increasing use of mechanically-operated automatic ricating mechanisms, all adds up to better protec- n for the investment of today's buyer of high grade achinery. Surface quality control is essentially a U. S.-inspired development, and has, naturally, made greater strides here than abroad, although the Germans were well started in this direction at the time of the start of the last war."

Powder Cutting Provides Scrap from Skulls and Buttons

R. S. BABCOCK

Development engineer, Linde Air Products Co., New York: "Scarcity of heavy melting scrap in steel mills and foundries is being met in part by the rapid reduction of slag ladle buttons, skulls and spills. This has been brought about by the introduction of large oxygen cutting apparatus which in many plants has replaced slower oxygen lancing operations.

"These giant size cutting blowpipes produce stable reaction zones, penetrating through steel sections exceeding 6 feet in thickness. Mechanization of the process by mounting the apparatus on a motorized carriage base provides means of progressive severing these heavy sections of ferrous material.

"Layers of slag, which are frequently found on the external surface and within these masses of reclaimable scrap, normally resist the action of the oxygen stream with oxy-acetylene or other preheat flames. This oxidation-resistant material can be overcome by introducing a finely-divided iron powder into the top of the reaction zone. The combination of heavy cutting equipment, plus the powder cutting attachment, has been used to cut slag ladle buttons up to 48 inches thick containing 25 per cent slag and cast iron buttons up to 56 inches thick having 3 inches of external slag layer.

"During 1948, thousands of tons of slag-incrusted masses of steel and iron were reclaimed by this practice, including a large percentage of scrap sections which were mined from dump areas. Skulls and buttons, which would have been buried previously because of the high cost of reduction by earlier methods, are now quickly and economically reduced to furnace charging size by the progressive powder cutting process.

"Further development of the powder-cutting process has proved that large sections of open hearth cinder and slag pit cinders up to 36 inches thick, containing 50 per cent metal with the remainder consisting of slag, brick and sand, can be almost as easily cut today as equivalent thicknesses of clean carbon steel."

Improved Hardening Procedure Seen Refining Today's Gears

G. E. KATZENMEYER

Vice president and general manager, Pittsburgh Gear Co., Pittsburgh: "More and more, top management and engineers, spurred by demands for greater production, have come to realize that continuous, long term, trouble-free operations of modern machinery and equipment depend largely on the selection of gearing that can really "take it" under any and all conditions.

"Industry, during the press of the war years and subsequent post war demands, has found that the type of gears that once seemed to suffice no longer conform to the higher speeds and greater loads required of them

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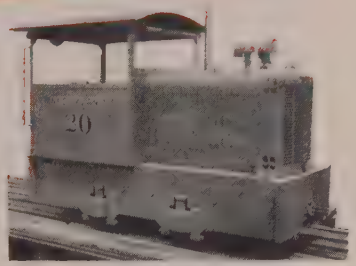

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today. Where once gears cut from ordinary materials and put into service with no heat treating at all or with just a suggestion of hit or miss hardening were acceptable, today the demands are increasingly for gears made from finest, laboratory controlled materials such as alloy forgings and alloy castings, and added to these the benefits of long tireless research to produce armored surfaces of just the right depth and hardness, with cores that are tough and shock resistant.

"The resulting gears of today give industry the type of long lasting, trouble-free service that translates itself into greater production economies, increased production output and decidedly lower operating costs. In every conceivable way they out-perform and out-last by many times those ordinary gears of former standard materials of ordinary heat treatment or without any hardening at all.

"Future trends in the gearing production craft are bound to stress even greater efforts to produce gears that will withstand the loads and speeds imposed upon them by industry. To this end responsible gear producers will be forced to exert even greater efforts toward scientific production and material selection, and more accurate and serviceable hardening procedures, with an eye at all times to the changing industrial world."

Steel and Aluminum Alloys Used in Oil Storage Tanks

FRED L. PLUMMER

Director of engineering, Hammond Iron Works, Warren, Pa.: "During the past year the writer made a survey of the possibilities of using a combination of steel and aluminum alloys for the construction of welded storage tanks used by the petroleum industry for the storage of 'sour' crude oils (those having high sulphur content). The roofs and roof supports of steel tanks used for this service corrode very rapidly and may become unserviceable after use for as short a time as 2 years, or even less.

"A combination tank with steel bottom and shell and with aluminum alloy roof plates and rafters offers a possible economical solution of this problem providing a tank with satisfactory service characteristics at a cost comparable to that for a steel tank lined with concrete or other types of construction that are being used. Precautions must be taken to avoid galvanic corrosion in the joint between the steel and aluminum alloy plates, and to provide for any effects due to wide differences in modulus of elasticity and coefficient of thermal expansion."

Automatic Machine Control in—Operators' Judgment—Out

D. B. RUSH

Chief engineer, Reeves Pulley Co., Columbus, Ind.: "Variable speed has definitely become a necessity to many industries and processes. Many products, as a matter of fact, would not be on the market today if it were not for the results of variable speed control equipment.

"Automatic control of speed is being demanded more and more—the trend is toward automatic control of machines wherever possible and away from the operators judgment. For top efficiency and economy demanded in many industrial processes of today, automatic production control is utilized.

"Function of automatic production control falls into three broad classifications: 1) Synchronization of different machines, or sections of the same machine, 2) maintenance of constant tension, uniform peripheral and winding speeds, constant velocity, and 3) maintenance of uniform pressure, weight, liquid level, temperature and other variable elements. With these three classifications in mind, we have designed our automatic control equipment to handle practically any application that comes along these lines.

"In machine tool industries, speed vitally affects both cost and quality of production. For maximum output at minimum cost, correct speed must be used for each cut or drill, for various depths of draw and for varying production schedules.

"Accurate speed control means (1) the exact speed needed on each machine and (2) controlled production through entire departments and plants, eliminating 'bottle necks', speeding up production and improving the quality of output.

"With so many elements of production costs definitely fixed and beyond immediate control, there remain few places where there is a chance to improve the profit curve. Large savings, however, can be made in all industries by making sure that their machine tools, conveyors, etc. are running at the exact speed to give maximum production, longer tool life, perfect synchronization of machines and departments and perfect synchronization of men and machines."

Electronic Devices Perform Functions of Rheostats

R. A. GEUDER

Manager, applied engineering dept., Reliance Electric Engineering Co., Cleveland: "Two items which are being produced regularly for application in many industries and specifically in the machine tool field are our VSC and VSS.

"VSC is an electronic means of changing the speed of a motor in exactly the same manner as is accomplished by a motor operated rheostat. As a matter of fact, it is equivalent to a two-circuit motor operated rheostat where the first part of the travel of the rheostat gives voltage control and the second part gives shunt field control. The VSC control can, therefore, give a very wide speed range including regulated voltage and can readily cover a 40:1 speed range. Moreover, it has the ability to control the rate of acceleration and deceleration and maintains that rate regardless of the preset speed to which the drive is expected to go. In other words, if the VSC arranges for acceleration to full speed in ten seconds it will get to half speed in five seconds and if the drive is set only to go to half speed it will reach there in five seconds.

"This timing for acceleration and deceleration is adjustable over a very wide range to suit the application. You can recognize that as a result of having regulated voltage the speed regulation will be materially improved.

"VSS happens to be also an electronic item which the equivalent of a manual rheostat. This is a un

wherein a small movement of about one half inch travel (requiring a very small force) can give full range of control for either a generator or a motor. It has been successfully applied as a programming control from cams on a multiple head machine tool and could also be a ready means of changing speed of the machine tool as the cut gets deeper and deeper as it might on a crankshaft lathe or equivalent. The advantage is that the control is absolutely stepless, it is essentially lineal, and it contains no wearing parts commonly associated with sliding contacts of rheostats.

"Both of the above items are not expected to eliminate rheostats from the control picture but have already proven themselves a real tool where continuous movement is a necessity and where an infinite number of steps is desirable."

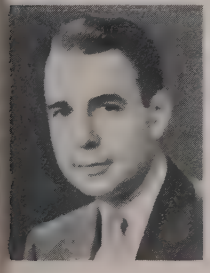
Refractory Research To Meet Controlled Atmospheres Seen

F. W. MULLER

Manager, high-temperature insulation department, Armstrong Cork Co., Lancaster, Pa.: "More durable insulating refractories play an increasingly important part in low-cost production as the metalworking industry operates at peak activity levels. The continued development of the heat-treating furnace as an integral part of the production line demands not only thermal efficiency but also furnace operation free of maintenance interruptions.

"Insulating refractory materials available today for heat-treating furnaces are capable of taking the punishment of operations that are being pushed beyond normal capacity. High strength, great resistance to spalling, and the ability to stand up in controlled atmosphere assures a minimum of costly down-time for maintenance and repairs.

"Research is being directed toward the development of insulating refractory materials capable of service at temperatures in excess of 3000° F. Because the use of the controlled atmosphere furnace is rapidly expanding, considerable research effort is being spent to broaden available technical information pertaining to insulating refractories in controlled atmosphere applications."



Future Hot Strip Mills May Use Generator on Each Stand

H. W. POOLE

Manager, steel mill division, industrial engineering divisions, General Electric Co., Schenectady, N. Y.: "After 10 years, a new tool has appeared—the magnetic amplifier, which now is emerging from the laboratory to the steel mill. Its operation is based on the principle of the direct current saturable reactor wherein a small input signal can be used to control a relatively large signal. This amplifier likely will take the place of the amplidyne or the electronic amplifier in many regulating circuits and be applied with the amplidyne in many others.

"Some of the future continuous hot strip mills likely will be laid out with individual generators for each stand, similar to the latest tandem cold strip mill practice.

"An existing plate mill on the west coast will serve as a rougher for four new 86-inch continuous finishing stands. Two mercury-arc rectifiers will be employed to start the mill motors from rest by phase retard. This will be the first time that rectifiers alone have been used in this country for full adjustable voltage control of a continuous hot strip mill.

"The world's fastest 5-stand cold mill has operated at 6250 feet per minute and has produced over 2100 tons of tin plate in a 24-hour period. Three other mills—a 93-inch, 3-stand sheet, a 54-inch, 4-stand sheet, and a 56-inch, 5-stand sheet and tin plate unit—have proved that individual generators are superior to the common bus scheme for modern high-speed mills.

"A 42-inch, 5000-fpm, 2-stand temper pass mill is being built. It will incorporate all of the latest features in electrical equipment and will nearly match the delivery speed of the fastest tandem cold reduction mills.

"A 23-stand, 3-strand continuous rod mill will be installed in Colorado. All stands are to be geared to adjustable speed direct current motors which can be operated on a common direct current bus or on two independent bus sections for added flexibility.

"Adjustable voltage control continues to be the accepted standard for processing lines. Higher strip mills, wider speed ranges, larger coil diameters, and more complex mechanical layouts serve to highlight advantages of adjustable-speed operation.

"A feature of the new 66-inch high-speed pickling line now under construction is the absence of the conventional dancer roll in the pickle tank. This roll, operating in 30 per cent sulphuric acid at 230° F always has required considerable maintenance. Instead, a magnetic loop position regulator will be used. This consists of a magnetic detector unit encased in an acidproof cover and located in the bottom of an acid filled tank. The output signal, which is governed by the position of the steel strip in the tank, is fed into a magnetic amplifier which in turn controls the speed of the entry pinch roll through a booster generator.

"The trend toward completely automatic operation of drawbenches continues. Refinements were effected in mandrel control which eliminated all manual work except starting the loading of the mandrel rods. A motor-driven pinch roll completes the loading.

"One of the fastest existing electrotinning lines has been given even greater capacity for some classes of product by the addition of 300 kilowatts of 9600-cycle induction heating for flow brightening.

"Hot-topping alloy ingots with an electric arc is a new steelmaking development. Each ingot is heated separately with a non-consumable electrode connected to a welding motor generator set. The electrode is positioned automatically by a small direct current motor and a voltage regulator of the amplidyne or electronic type. Work is progressing on a magnetic amplifier for the same purpose, which will require no electronic tubes or rotating parts."

Oxyacetylene Bar Cutting on Automatic Cycle

H. G. RATH

Development engineer, The Linde Air Products Co., New York: "A new oxyacetylene bar-cutting machine has gained recognition as a rugged, reliable production tool in the steel industry. Simple and inexpensive, two of these machines have been used in a rolling cycle over the past year for severing hot, die-rolled crankshaft stock into easily-handled lengths containing perfect multiples of forging blanks. They are suited for cutting hot or

rail bars up to 6 x 6 inches in cross section, and an alternate design will permit cutting test coupons from the center of a bar in one pass.

"Design permits selecting the plane of cut within a 4-foot range. Once this is accomplished, operating a single valve initiates an automatic cycle wherein the machine indexes a cutting nozzle (or pair of nozzles) both horizontally and vertically with respect to the work piece; makes the cut; shuts off the cutting gases; then retracts from the work and resets the cycle. All controls are pneumatic, the only services required being oxygen, acetylene, compressed air and water."

Hydraulic Duplicating Device Slashes Machining Time

H. B. NEWTON

President, Rockford Machine Tool Co., Rockford, Ill.: "Railroad splice bar dies have previously been planed to a gage, with the tool set manually at the start of each cutting stroke. This former operation was further complicated by a slight camber in the center of the die, which necessitated machining the form through two setups.

"Increasingly close tolerances in rail design made the cost of this operation excessive, since the splice bar dies had to be modified constantly as the rail rolls wore.

"A hydraulic duplicating attachment mounted on a standard double housing Hy-Draulic planer has solved this difficult machining problem. The form of the die is duplicated from an inexpensive sheet steel template, mounted on the planer crossrail and behind the duplicator head. The correct form is reproduced in the work as the tool feeds across.

"The camber is produced by an interchangeable cam track mounted on a laterally, reciprocating table. A stationary cam follower mounted on the planer sidehead controls the camber as the machine table reciprocates.

"Machining time has been reduced to a fraction of the former time, and tolerances can be maintained well within specified limits.

"The sub-table is quickly demountable and the duplicating head traversed out of the way, freeing the planer for conventional work."

Rod Mill Thrust Mounting Promotes Efficient Operation

A. STEWART MURRAY

Assistant chief engineer, SKF Industries, Inc., Philadelphia: "A new rod mill roll neck thrust mounting currently is being employed in major installations of three principal types of roll neck bearings in rod mills, namely, water, oil and roller types.

"Angular contact ball bearings in a properly designed mounting have conclusively demonstrated their suitability for rod mill service. When used in conjunction with roller and oil film bearings, two rows of angular contact ball bearings are inside each chuck, while the principle for use of water bearings is essentially that employed in most of the modern wide hot strip mills. In this third type each roller has a radial bearing on each neck and at one end a rolling element thrust bearing.

"In November, 1943, a new West Coast 20-stand rod mill began rolling three strands simultaneously, with water bearings on each neck for the absorption of radial load only, and, on the extension of the operating side roll neck a pair of flush-ground separately housed angular contact ball bearings locate the roll axially in both directions. During the intervening 5 years, this thrust mounting eliminated the old troubles experienced at highest speeds, unsatisfactory location of rolls, and undesirable maintenance on this particular mill.

"The year 1948 has seen capacity operation of major installations of angular contact ball bearings at the thrust location of rod mills employing roller and oil film bearings respectively for only radial load. Also, there have been additional water bearing equipped mills improved by the addition of this design."

Trend to Precision Regulation Noted in Rolling Mill Practice

W. R. HARRIS

Manager, metal working section, industry engineering department, Westinghouse Electric Corp., East Pittsburgh, Pa.: "A major trend in electrical apparatus for the steel industry has been the increasing use of precision regulating equipment. The most pronounced trend in this direction is the use of rotating regulators such as the Rototrol to solve or simplify existing and new regulating problems. A minor but still a definite trend is also toward the use of electronics equipment for precision speed and process control. The increased usage of such devices has resulted from the use of higher productive speeds, more rigid quality control, and a desire to automatically control operations and processes to eliminate the uncertain human element in continuous duplication of results.

"The Rototrol is a small direct current machine exactly similar in design and theory of operation to a standard direct current generator but with several field windings which are connected in various ways, depending on the regulating problem. The unit functions entirely through the interaction of these fields and after initial adjustment, no attention is required other than the routine maintenance associated with a direct current machine of similar size. It is possible that no single electrical development has been applied to as wide a variety of steel mill applications. Representative applications are for blast furnace skip hoist drives, blooming and slabbing mill drives, tandem cold reduction mill drives, single stand cold reduction mill drives, and processing line drives where the device is used to regulate or limit speed, voltage, current, horsepower, or tension. Other applications include power factor regulation of synchronous machines, arc furnace electrode positioning, and voltage regulation of alternating current generators.

"Electronic regulators are also finding increasing usage for applications such as edge control on the ends of processing lines, and the various forms of loop control, as well as for such difficult applications as minimizing impact speed changes for rod mill drives. These units have reached a high degree of perfection and are designed to operate with relatively little maintenance

attention. Introduction of anticipation and anti-hunt- circuits to electronic devices is simpler and easier n with other types of regulators and low power input m the error detecting device and practically instan- eous response gives further impetus to their use.

One of the most interesting applications of electronic ulators has been for rod mill drives. The trend in dern rod mill practice is to gain flexibility and sim- y mechanical layout by increasing the number of tors driving the train. Many mills are designed for ling two or more strands simultaneously and adjacent ividually driven stands are often as closely spaced as sible. Thus, it is necessary to minimize the tran- nt speed variations which occur when the bar enters l leaves each section of the train. Experience of the lls with this form of regulating equipment shows that impact speed disturbances are minimized to the nt that they are no longer a serious operating prob- n. Operating experience has been excellent on close- spaced finishing stands driven by individual motors as ll as on individually driven stands in the intermediate l roughing trains."

Less Conditioning Cost Possible With New Oxygen Blowpipe

J. S. KANE

Development engineer, Linde Air Products Co., New York: "To assist the metalworking industries in their efforts to increase steel production, a wide-cut lightweight, but rugged, blowpipe has n developed for hand deseaming operations. This face conditioning tool has been enthusiastically re- ved by both management and operating personnel.

'Time and labor involved in the preparation of semi- ished steel for rolling can be minimized by the intro- ction of this blowpipe which makes a flat surface cut re than 3 inches wide. Accurate control of the ex- mely wide flat cut, ease in manipulation, instantaneous rts and ability of the blowpipe to carry the cut at rela- ely high speeds promotes lower conditioning costs. Use this blowpipe continues to expand for the surface re- val of splits, cracks, tears, seams, checks and breaks slabs, ingots, blooms, bloomdowns, billets, seamless nds, and forging stock.

'High production rates per man-hour at low tonnage ts combined with reduced operator fatigue has had a -reaching effect in the steel industry.

'Steel men have found that one asset of the wide-cut wpipe is its ability to re-condition material that could be profitably processed if conditioned by other meth- s. It is an ideal tool for the removal of deep defects. ility of the blowpipe to reduce man hours in the 'hog- g out' of deep snakes in large slabs and ingots pro- es a means for reclaiming material heretofore destined scrap, at attractive savings."

es Greater Use of Automatic Machining Equipment

G. HOGLUND

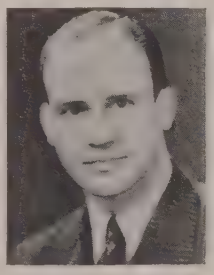
neral sales manager, Heald Machine Co., Worcester, ss.: "Trends are developing in the metalworking indus- which place more emphasis than ever before, not so ch on the demand for facility in a specific piece of ipment to give greater production and quality, but her on the broader aspect of a combination of several factors pointed toward further reduction of processing costs and improvement of product.

"One such factor is the search for new, different and better processes to enable the product to be completed at less cost. We see this trend exemplified in the design of greater numbers of parts to interject metal forming processes and precision castings to minimize costly chip-making in machining parts to accurate size and shape. Intensified control of stock removal requirements also is being emphasized to accomplish the same purpose.

"Another factor is the emphasis being placed on controlled production of parts through greater stress on automatic equipment which, so far as possible, will relieve the operator of responsibility for judging the accuracy or uniformity of successive parts produced.

"Continuing major advances in gaging and measuring instruments have obsoleted yesterday's, and are further obsoleting today's, standards of accuracy and finish, with resultant emphasis on metalworking equipment capable of maintaining greater than ever precision under conditions of higher production.

"As great as has been progress to the present time, it is even now embryonic as related to future possibilities for technical advancement in the processing of metals."



Burden of Operating Demands Taken Up by New Machinery

A. L. THURMAN

Assistant vice president, Aetna-Standard Engineering Co., Youngstown: "At this stage the emphasis of metalworking industries is on production. The heavy demand for metal products is pushing every machine to the maximum output. New machinery recently put into operation is contributing heavily to these operating demands.

"Sheet and strip handling and processing equipment now in operation in both the ferrous and nonferrous fields are showing remarkable production records. New continuous galvanizing lines for producing highly adherent coating are producing a record output of a quality product. Continuous lines for the production of conventional galvanized sheets and coils are producing an increasing share of these sheets. A new continuous long terne line just put into operation is another major contribution. New continuous electrolytic tinning lines are also being put into operation.

"There are a number of continuous annealing lines currently in operation which are being used in the processing of a wide variety of strip products. A radically new type high speed annealing line has also been developed for processing of tin plate material, and its use is expected to provide a lower cost method of producing a high output of a high-quality product.

"In tone with these higher production records, new high speed cleaning lines, scrubbing and drying lines, shearing lines, side trimming, slitting and recoiling lines are also being put into operation and are under construction. An improved type of high speed classifying line also is in the late stages of development. The application of these continuous processing lines is thus being broadened to keep the speed of processing and coating of material in step with the higher rolling speeds of today's new continuous strip mills.

"One new sheet galvanizing line which has just gone into operation has already set new production records

and at the same time is providing a superior coating for this type of equipment.

"There have also been a number of recent developments in the production of hot dip tin plate. Based upon a principle originally developed by the Tennessee Coal, Iron and Railroad Co., twenty-one automatic feeding and electrolytic pickling units have been added to existing hot dip tin stacks at one plant. This principle is used to eliminate much of the disagreeable and costly preparation of black plate prior to tinning. The surface is better prepared, reducing the number of menders and 'waste-waste'. Tinning speeds also have been increased thus lowering overall production cost.

"Major improvements and developments also are found in both seamless tube and buttweld pipe mills. Many detailed improvements have been made to tube mill machinery. Two new continuous high speed tube rolling mills soon to go into service, for example, will greatly increase the capacity for seamless tubing. In conjunction with both of these mills, stretch reducing mills will be used in which the pipe is stretched at the same time it is being reduced. Additional stands are being used on all new buttweld pipe mills as a result of the successful installation of a recent 12-stand mill. Some existing 6-stand mills are being supplemented with additional stands to increase speed and output of buttweld mills.

"The cold draw industry has greatly increased its output in the last year for both tubing and bars. Extended application of the triple drawing of tubes in the nonferrous industry has been a major factor in this increase in production."

"In the cleaning and finishing field, there has been a steady increase in the use of semiautomatic and fully automatic equipment. The use of spray cleaning is being widely applied. The mechanical force of the spray combined with the chemical action of the cleaner does a rapid and efficient job."

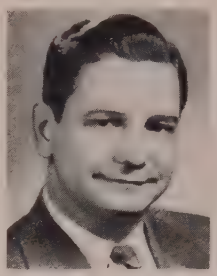
High Costs Make Management Efficiency Conscious

W. C. DENISON JR.

President, Denison Engineering Co., Columbus: "I'm bullish on the outlook for the entire hydraulic industry for years to come—regardless of fluctuation in the trend of business in general. Here's why: Never has management in every field been more conscious of the need for increased machine efficiency. As labor costs increase, as distribution costs go up, an important portion of a company's profit must come from savings within manufacturing costs. Increased speeds, lower operating costs and negligible maintenance that have been accomplished by hydraulic equipment in recent years have brought this 'infant' in compact power and control into sharp focus.

"Number of new and important company names in almost every industry that appear on our books each month indicates a rapid growth in the way oil hydraulic equipment is answering management's quest for lower production costs today. New developments in complete hydraulic equipment as well as hydraulic components also constantly open the way to new applications.

"Speed and more speed . . . ever increasing power in smaller and smaller space . . . easy mobility of complete production units . . . quietness of operation with its tremendous effect on worker efficiency—these are only a few of the factors which contribute to the steady growth of the hydraulic industry."



Blast Cleaning Adapted To Specific Applications

CHALMER R. CLINE

Assistant to president, American Wheelabrator & Equipment Corp., Mishawaka, Ind.: "The past year witnessed a growing interest in blast cleaning equipment designed for a specific application. This is especially apparent in the development and acceptance of continuous, automatic machines for production line operation, giving promise of appreciably reducing cleaning room costs while, at the same time, improving and simplifying operations.

"Another significant trend is in the widespread adoption of blast cleaning by companies engaged primarily in reconditioning various metal parts. These include automotive parts, pipe lines, steel drums and other industrial equipment. It probably reflects the continuing scarcity of steel and the increased recognition of the need for thorough cleaning before the application of protective coatings.

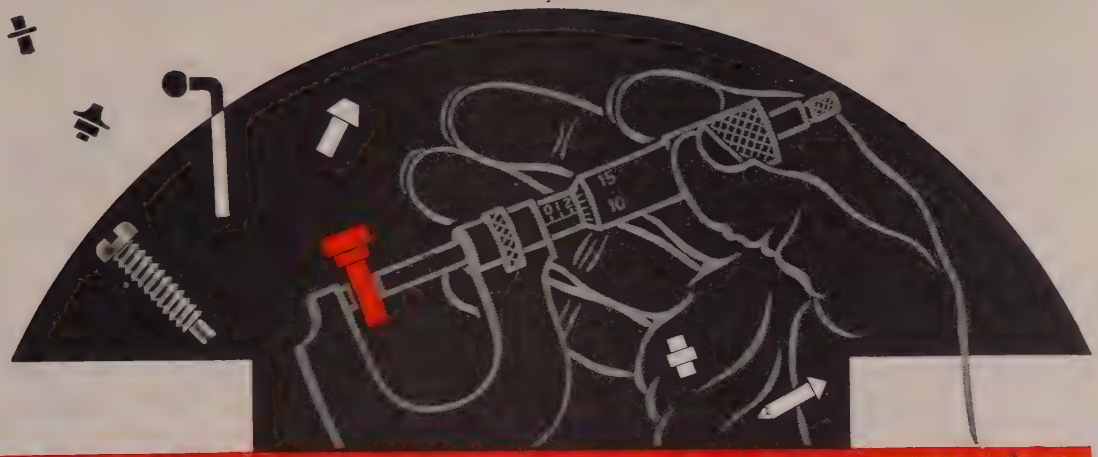
"Although chilled iron shot, and grit, and sand presently are most used as the abrasive for blast cleaning applications, newer types of abrasive are expected to play an increasingly important part in reducing cleaning and peening costs and in providing special finishes. In this category are malleablized iron shot and grit, chilled iron shot drawn to softer hardness, nonmetallic types such as crushed nut shells and aluminum oxide, wet slurries containing either metallic or nonmetallic abrasives, and recently introduced true steel shot and copper shot both of which are much less susceptible to breakage than iron shot."

Business Volume Hinges on Steel Supplies, Government Attitude

A. F. ANJESKEY

Sales manager, Cleveland Trail rail Division, Cleveland Crane Engineering Co., Wickliffe, O.: "It is our opinion that if the necessary materials were available which are required in the making of overhead handling equipment, we can expect that a good volume of business can be closed in 1949. Manufacturers generally who use steel will feel the pinch of scarcity and projects which were planned for 1949 will probably be deferred. This may in turn defer the purchase of machinery and equipment. Another factor that will play an important part in determining capital outlay will be the attitude of the government on taxes and labor laws.

"Insofar as progress in development of new equipment is concerned, we have developed and are now in a position to offer for sale equipment which will make possible an increase in the storage of wire rod. We expect to make by the end of this year the first installation of this new equipment, and it is estimated that storage capacity will be increased at least 25 per cent, and make possible more efficient handling in storage of rod and wire."



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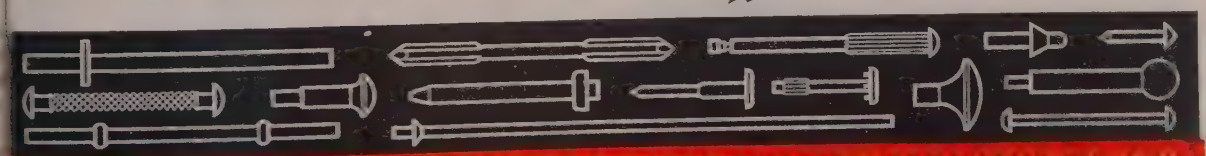

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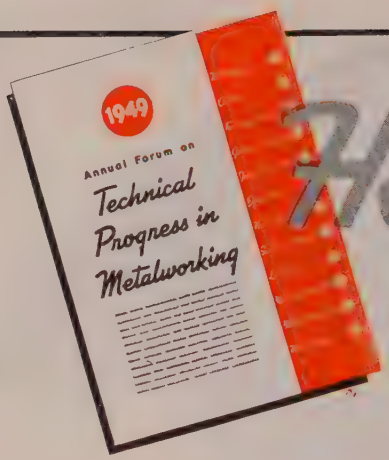

Heat Treating

Automatic flame hardening "saving" skilled operators . . . Dry Cyaniding gaining in popularity . . . Mechanized heat treating methods to expand rapidly . . . Swing toward controlled atmospheres noted . . . Surface hardening methods used more widely

Heat Resisting Alloys Afford Increased Service Life

T. A. FRISCHMAN

Chief metallurgist, axle division, Eaton Manufacturing Co., Cleveland: "To the cost-conscious metallurgist, expense of maintaining heat resisting alloys in industrial heat treating furnaces is a very important item. Problem is the same whether the heat resisting alloy is used for supporting or conveying parts through the furnace, or whether it is an integral part of the furnace. Replacement of the more generally known materials, such as 25-12, 35-15 and 60-12 by Inconel, offers some relief in this direction, especially in gas carburizing furnace applications. Bolts, studs, nuts and other internal parts, many of which are often located in inaccessible locations, give considerably longer service life when made from Inconel than from the other materials formerly used. Likewise, carburizing pots, covers and fixtures also give increased life when made from Inconel. Though the initial cost is somewhat higher, the longer life substantially offsets this difference."

Heat Release by Detonation Has Industrial Possibilities

EUGENE D. MILENER

Coordinator of utilization research, American Gas Association, New York: "Advanced studies in combustion of industrial gas now being sponsored by the committee on industrial and commercial gas research of the American Gas Association may have an important bearing on the number of high temperature metal heating processes in the future. Advances in combustion engineering have been largely mechanical, and designed chiefly to increase the normal rate of flame propagation. While normal flow propagation velocities are comparatively slow, nature provides another form of "combustion" of the order of one thousand times as fast. This is the process known as detonation.

"Should it be possible to control this natural phenomenon, intensities of heat energy release many times greater than anything now employed could be realized. This subject has been investigated by different scientists, but the question still exists: Can the detonation process be made to fulfill a practical industrial function?

"Following theoretical and mathematical studies, and experimental apparatus has been developed for studying the detonation process under dynamic or rapidly changing conditions, and energy releases of up to 20 million Btu per cubic foot per hour have been easily obtained to date. Mechanics of developing and applying such heat-release apparatus on a full scale basis in metallurgical and other applications, offers a challenge at this time, but might bring rich rewards in the future."

Automatic Flame-Hardening Greatly Improved

H. V. INSKEEP

Development engineer, The Linde Air Products Co., New York: "Flame-hardening is a process whereby an article of hardenable steel can be selectively surface hardened by the application in close succession of high-temperature oxy-fuel gas flame and a suitable quench. The areas hardened can be varied from a small spot to the entire surface of large rolls. The basic equipment required is a welding torch equipped with a single-flame tip, a supply of oxygen and fuel gas, and a water hose for quenching. The equipment can harden small areas, either round or elongated, depending on how the torch is moved over the work. Results obtained depend on the skill of the operator. For hardening large areas, multi-flame heads or burners are used, and these burners usually are moved over the work by a machine which carries the burner torches and quench.

"The past year has seen the commercial introduction of automatic and semi-automatic machines in a state of perfection never before realized. These machines by their automatic action, have done away with the need for the skilled operator. Heat input to the steel can be pre-set for continuous or intermittent operation, and the period of heating is controlled by timers or temperature indicating devices. One type of machine designed for spin hardening of relatively small parts exactly controls the surface temperature of each part hardened. This machine has a high production rate of flame-hardened parts, each hardened to a high degree of uniformity.

"Another type of machine will flame-harden relatively large articles such as gears, shafts, and rolls with

a similar degree of uniformity. Special machines for the progressive hardening of gears are available—one, a machine for small gears which is fully automatic, and the other a machine for large gears which is semi-automatic.

Availability of these precision machines has placed the flame-hardening process on a par with the other highly engineered production processes and they have given industry precise tools to utilize a basic method of hardening to an extent not heretofore possible."

Vertical Pressure Quenching Increases Rockwell C 5 points

G. M. SALZMAN

Vice-president, Monmouth Products Co., Cleveland: "We have installed in our heat treating department a pressure quenching fixture having 240 $\frac{1}{8}$-inch holes in 16 $\frac{3}{4}$-inch steel pipes 18 inches long and radially disposed on a 6-inch diameter. This fixture extends vertically into our standard temperature controlled quench tank. It is fed by 130° F quench oil in the amount of 150 gallons per minute at 50 pounds per square inch by a centrifugal booster pump.

"Pins, of either 3115 or 4615 steel, having sections up to 1½-inch in diameter and 14 inches long with steps, serrations and keyways, were a problem. These pins, carburized and cooled, are reheated in our neutral salt bath at 1450° F. They are then vertically quenched in the pressure fixture to give them a uniformity of hardness, Rockwell C 65-67, on the shaft bearing surface. This is an increase of from 4 to 5 points in Rockwell hardness and complete elimination from the spotty hardness previously obtained. Also the time element and degree of straightening was appreciably reduced.

"We are planning variable shaped fixtures which will quickly connect to our pumping source for a variety of other peculiarly contoured and sized parts."

Dry Cyaniding Process Gaining Converts in Industry

WILLARD ROTH

Engineer, industrial heating division, Westinghouse Electric Corp., Meadville, Pa.: "Process of dry cyaniding is gaining converts, and the past year has seen a number of furnace installations for the processing of small machine parts. It is proving less costly than liquid cyaniding, and lends itself to closer quality control. Of particular interest are installations of shaker hearth type furnaces, designed for small parts handling, which are used interchangeably for hardening and dry cyaniding merely by altering the furnace atmosphere. Endogas atmosphere is used in hardening, and is enriched with ammonia and propane or natural gas for dry cyaniding.

"Cycle annealing for improved machinability is another cost-saving process which is receiving widespread attention and a group of large production furnaces for cycle annealing are now going into service. These are roller hearth furnaces with quick transfer from one chamber to the next, utilizing radiant tube heating and gas quenching or cooling. Controlled atmospheres are used, aimed at scale-free surfaces.

"In the controlled atmosphere field, work continues in the refinement of carbon pressure controls and measurement. The end result will be simpler operation, better control."

Salt Bath Isothermal Treatment Aids Tool Steels

C. R. FOREMAN

Metallurgist, Park Chemical Co., Detroit: "The past year has seen few new developments in the salt bath field. Use of salt baths for the melting of nonferrous alloys, aluminum coating of steel wire, and for heat treatment of powdered metal parts is still in the experimental stage.

"However, in recent years, salt baths have been finding increasing application in the isothermal heat treatment of production and tool steels. Employment of water-soluble liquid carburizing salt baths is increasing as is the salt bath hardening of high speed and other tool steels. The Neutra-gas process for the maintenance of neutrality in neutral salt baths is being applied to high heat baths with encouraging results.

"We do not look for any startling developments in the use of salt baths during the coming year. Rather, we expect the use of this metallurgical tool to increase."

Use of Induction Furnaces Continues To Increase

R. N. BLAKESLEE

Vice president, Ajax Electrothermic Corp., Trenton, N. J.: "Industry's purchases of induction heating and melting equipment continue good. Sales volume for the year will be about equal to that of last year; and the field appears to be spreading at about the same rate.

"With nothing startlingly new to report, the trend is continuously toward the conversion of fuel-fired furnaces to induction furnaces for both melting and heating applications. Enough equipment has been installed to show that, even for common forge work, induction heating can be more economical; and in the melting field, not only are the small brass and specialty foundries turning to induction but also some of the cupola foundries where a high grade alloy cast iron is melted. Extent to which the cupola field can be pierced by the induction furnace is being studied carefully and it is hoped that figures of interest to the industry can soon be released."

Heat Treating Methods Mechanized Rapidly

R. B. SCHENCK

Chief metallurgical engineer, Buick Motor Division, General Motors Corp., Flint, Mich.: "Use of mechanized equipment in heat treating ferrous metals is increasing rapidly and doubtless will continue in this direction. An important development is the increased use of controlled atmosphere furnaces for such processes as gas carburizing, clean hardening and annealing, brazing, etc. Much credit is due the equip-

ment manufacturers and those who have studied the thermo-chemistry of gases.

"Hot quenching, in the form of austempering, martempering and other modifications, is coming into extended use and finds an ever-broadening field. For certain applications where distortion, cracking or residual stress are serious problems, this process fills a long-felt need. The development of the electrode-heated salt bath is an important factor in the success of this method of heat treatment.

"Isothermal annealing, greatly improved through our knowledge of TTT characteristics and the availability of better equipment, has reduced cost and at the same time improved quality. There is little doubt of its rapidly extended use in the future. Induction heating for annealing, hardening, tempering, forging, and brazing has made rapid strides and will doubtless continue to do so. This process is comparatively new and its ultimate possibilities and limitations cannot be readily visualized at this time."

Salt Bath Heat Treating More Flexible, Uniform and Cheaper

A. E. CARPENTER

President, E. F. Houghton & Co., Philadelphia: "In recent years emphasis on production line heat treatment has resulted in development of a number of processes designed to speed up such treatment and fit the procedure into mass production plans.

"Most of these newer methods apply only to identical parts being treated in sufficiently large volume to warrant the expense of special dies and fixtures. Each time a dimension changes by as little as a few thousandths the fixtures must be changed.

"By contrast the modern mechanized salt bath has much more flexibility and at the same time answers the need for production line handling. It is now possible to load work at one end and pass it through the necessary furnaces, quench and cleaning bath automatically on a pre-arranged time cycle, coming off at the other end uniformly heat treated and ready for the next step in the manufacturing process.

"This advantage of flexibility of the salt bath method appeals to many heat treaters whose volume of work for any one size of part does not warrant the installation of elaborate and expensive equipment to handle only a relatively few parts of the same size. In salt the only change necessary when work parts vary is to change the time cycle, depending on thickness, volume and shape of the part.

"Of course, one of the major arguments for use of the molten salt bath is its uniformity of heating—no cold spots—a control of within 5°F throughout the bath. Now that size of the pot can be increased by multiple sets of electrodes, the bath's capacity may be adjusted to the exact needs of the user.

"Therefore it is apparent that salt bath heat treating, while not as rapid per piece as some newer methods—although still much faster than the procedure of years back—is far more flexible, more uniform and economical. The matter of economy applies to both installation cost and upkeep. Figures of comparative costs between gas and electric salt bath furnace operation show a marked advantage in efficiency and low cost in favor of the latter method.

"The trend towards simplification of varieties of metal processing products is a natural one in times of rising production costs. For example, in our own line is a 'fortified' cutting base which is being used by a large number of shops for 90 per cent of all their machining needs."

Premixing of Gases To See Greater Use

EDWARD J. FUNK JR.

Chief engineer, C. M. Kemp Manufacturing Co., Baltimore: "Heat applications in the metal working industries are many and diversified. Some are quite familiar to the combustion engineer, having been used for many years and more or less taken for granted. Others call for divergence from conventional means and require ingenuity on the part of the designing or application engineer.

"Use of manufactured and natural gas as a fuel for such purposes has long been recognized as a standard tool for industry. With the current gas shortages and curtailments, study of methods of fuel economy takes on an added importance in addition to the dollar savings.

"The premixing of gases with combustion air automatically at a central point for specific applications will see greater extension. This offers the maximum in fuel economy by assuring that fuel will be proportioned with the requisite amount of air. Additional benefit in the way of accelerated combustion rates are reflected in both increased production and control of manufacturing costs."

Heat Treating Trend Toward Controlled Atmospheres

W. H. HOLCROFT

Vice president, Holcroft & Co., Detroit: "Trend in heat treating seems to be definitely toward the use of controlled atmospheres. These atmospheres may be classified as follows:

1. A high CO_2 atmosphere formed by the partial combustion of gas and air. This atmosphere is free of oxygen and the water vapor is reduced by use of cooling towers and possibly dehydrators. Production of this atmosphere does not require external heat and CO_2 contents of between 5 and 12 per cent are easily obtainable. This atmosphere may be used in bright annealing of copper and steel products or for malleable annealing.

2. A low CO_2 atmosphere formed by a catalytic reaction of gas and air in an externally heated retort. By controlling the ratio of CO to CO_2 this gas can be used for clean annealing or clean hardening of steels without decarburization. It is also used for restoring carbon to decarburized surfaces and for increasing the carbon content of thin pieces of low carbon steel.

3. An atmosphere similar to (2) to which a hydrocarbon is added for gas carburizing of steel parts. Present day knowledge allows accurate control of surface carbon concentrations and of hardenable case depth.

4. An atmosphere similar to (3) to which ammonia

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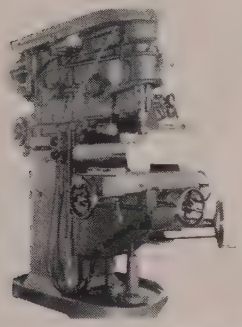

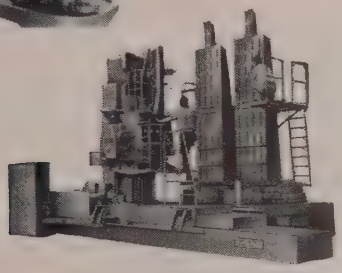

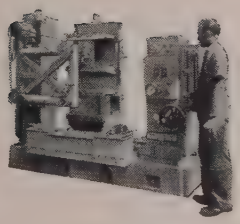

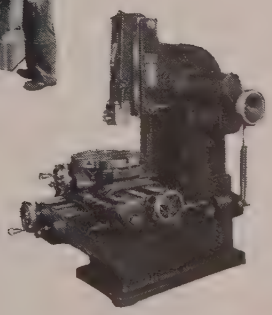

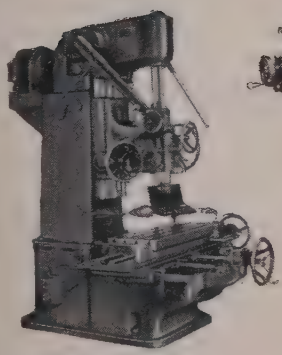

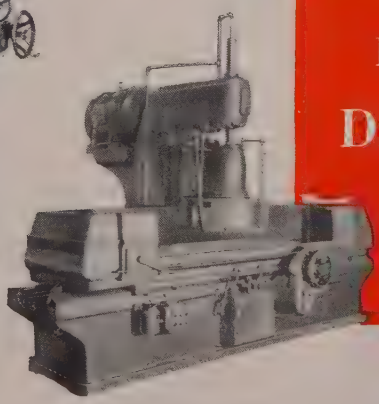

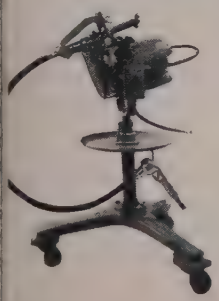

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5. JIG BORERS, for precision-boring of punch and die sets and intricate molds and dies, of all kinds.
6. VERTICAL SURFACE GRINDERS for rough or finish grinding of almost any material. Provides exactly the right table speed for each job. Available in several sizes.
7. KELLERFLEX MACHINES — flexible shaft equipment for efficient finishing of dies and molds. Both multi-speed and direct drive types, in 14 models.

NOT ILLUSTRATED: JIG GRINDER, for relocating and finish-grinding straight or tapered holes to "tenths," in hardened steel. KELLER CUTTER AND RADIUS GRINDER: sharpens die-sinking and Keller cutters, shapes Keller tracer points. VERTICAL DIE GRINDER: prepares new die block surfaces prior to machining, sharpens dull dies, reconditions die block faces before resinking operations. BURS (rotary files); used in Kellerflex and similar machines, for finishing jobs. P&W furnishes hundreds of styles, shapes, sizes in both high-speed steel and carbide, plus grinding and polishing wheels, etc. SMALL TOOLS: including die-sinking cutters, Keller cutters and tracer points, drills, reamers, counterbores, end mills for jig borers. P&W GAGES: entire range of cylindrical gages, thread gages, snap gages, precision gage blocks, and basic measuring equipment.

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"There is no better-paying investment than the right tools for the job"

added for carbonitriding. This process gives greater hardenable case for given temperature and time than gas carburizing and can be used where distortion characteristics require low temperature processing or for quenching below the critical of the case."

Liquid Nitrogen Treating Has Promising Future

R. E. BLUDEAU

Development engineer, The Linde Air Products Co., New York: "High-purity liquid nitrogen has been used successfully as a low temperature refrigerant in a wide variety of new applications, and promises to gain wider recognition as its advantages become better-known to the industry. Because of its low boiling point at atmospheric pressure, minus 321° F, it can be applied to special uses requiring low temperature.

"Standard machines have been developed for expansion-fitting. These units automatically eject metal parts which have been chilled to liquid nitrogen temperature. They have found acceptance in the automotive industry, making possible tight expansion-fit assemblies of valve seat inserts, and similar parts. Small machines are available which have cooling capacities in excess of 1500 parts per hour, and are capable of removing 3000 Btu's per hour at minus 321° F.

"Among other fields which show promise is the use of liquid nitrogen for pulverizing materials which cannot be treated successfully by conventional refrigeration methods. The materials to be ground are chilled to a temperature where their resistance to impact is greatly decreased, then pulverized to fine-particle size in standard-type grinding machines. Liquid nitrogen can also be advantageously used for applications requiring embrittlement of materials, such as flash removal on rubber and plastics, for aging special steels and for many other purposes. It is being used, for example, to harden soft alloy dies which can be used for a number of stampings between chillings, thereby eliminating the expense of machined tool steel dies to be used only for experimental work, or to produce a relatively small quantity of parts.

"Use of liquid nitrogen as a refrigerant makes possible relatively simple and automatic cooling systems, capable of operating within any desired temperature range. It has the additional advantages of being the coldest commercial refrigerant available, and can be readily transported to the job."

Sees Advancement in Surface Hardening Methods

HOWARD E. BOYER

Chief metallurgist, American Bosch Corp., Springfield, Mass.: "In reviewing the more recent developments in the heat treating field it appears that the most outstanding advancements have been made in methods of surface hardening. Carbonitriding is relatively new, but is being received with increasing favor in modern industrial plants. This process is best adapted to case hardening parts which require a thin file hard case. Nitrogen obtained by decomposition of ammonia gas serves to lower the austenitizing temperature and to slow down the critical cooling rate of steel thus permitting an oil quench to result in a file hard case when applied to types of steel normally requiring a more drastic quenching medium.

"Carburizing temperatures and time cycles are thus decreased and distortion is minimized. Costly cleaning operations involved in liquid carburizing are eliminated by the use of carbonitriding, so that it serves to decrease cost and increase production of a relatively wide variety of steel parts. Carbonitriding is now playing an important role in the heat treating field and its future seems assured.

"Quality control by statistical methods has entered the field of heat treating and metal fabrication and is apparently in to stay. It not only serves to improve quality, but decreases cost by revising inspection operation and emphasizing weaknesses in operation sequence."

New Special-Purpose Induction Heating Units Recently Started

R. M. CHERRY

Manager of sales, industrial heating division, General Electric Co., Schenectady, N. Y.: "Use of induction heating for forging, upsetting, and hot forming is beginning to receive the attention it deserves. Several new installations clearly provide outstanding advantages such as improved production, more desirable working conditions, material savings because of the elimination of scale, and longer life because of uniformity of temperature. In addition, in many cases induction heating lends itself to automatic material handling, thereby resulting in further reduction of cost.

"Use of the induction heating method for selective heating continues to find many other new applications in industry for annealing, soldering, brazing, and hardening. Typical of improvement in product and reduction in processing cost is the experience of a manufacturer of calculating machines where the freedom from distortion, as obtained with induction heating methods eliminated grinding operations previously necessary. The result: Costs reduced to 12 per cent of previous cost and the product improved.

"For high production of similar parts, many special-purpose mechanized induction heating equipments were installed in the past year. Typical of this class of equipment is the installation of electronic heating equipment in the production lines in the manufacture of farm machinery, automobile parts, refrigerators, and washing machines.

"New applications of high frequencies for the dielectric heating of non-conductors have been made. Typical example is the heating of cones of twisted paper thread for control of moisture content. A conveyor type oven in which the cones are progressed between electrodes for dielectric heating at 27 megacycles provided the solution to this problem of proper moisture control within the cones.

"Another example of the new uses of electric furnace equipment is annealing in protective atmosphere of hollow ware steel parts for porcelain enameling, thereby eliminating pickling which was formerly used in cleaning the surface.

"Use of electric furnaces for short-cycle annealing

alleable iron continues to increase. Several new installations have been made where the total annealing cycle varies from 20 to 48 hours.

"The general trend in furnace design is toward more and more mechanization. A typical example is the automatic handling of the trays for a large roller hearth furnace used for furnace brazing. The loaded trays are automatically charged, discharged, and returned to the charging position. This eliminates all manual handling except that required for loading and unloading parts."

High Manufacturing Costs Offset by High-Speed Heating

FREDERIC O. HESS

President, Selas Corp. of America, Philadelphia: "During 1948 an increased interest in and acceptance of high-speed heating with gas has been noticeable and striking. Issuance of the independent Battelle report, exploring, in behalf of the gas industry, the relative position of induction heating and high-speed gas heating in the steel industry, as of now and the future, has undoubtedly been stimulating. Principally however, the performance of existing installations has substantiated claims that high-speed heating methods, or *gradiation* heating, deserves not only consideration but materially assists in production improvement and cost reduction.

"Realization that industrial heating is more than mere heating to work temperature but should actually be considered and undertaken as heat-processing, has been mainly responsible for the expansion of high-speed heating applications. The fact that installations for continuous heating of steel billets with capacity of 40 tons per hour, are being undertaken and put into practice, not only indicates the potential of high-speed heating for tonnage production, but will provide further proof that continuous heat processing, based on high temperature gradients, can make major contributions in offsetting high manufacturing and labor cost, and in effecting material savings as well as product improvements. It is our firm conviction that this tendency will increase in the future."

"Bugs" Eliminated in Convection Annealing System

L. WHITTEN

Vice president, Lee Wilson Engineering Co., Inc., Cleveland: "The end of 1948 finds our organization with the mechanical problems of the convection heating system design well behind us after a three-year campaign in design and development of a steel coil annealing system.

"In development of heavy equipment, time only is the answer to durability and maintenance costs. A start must be made with the first elements at hand. Field usage brings the problems and hard work and ingenuity the answers.

"The answer is annealing equipment which processes steel 2½ times faster than before with a closer temperature field in the coils than has ever been realized previously—and this is done without excessive grain growth in any part of the coil due to the elimination of the long soak of older cycles.

"Coil annealing by heating from the edges is a developed process—not only for the large strip and tin mills but also for the narrow strip mill for high carbon as well as low carbon materials.

"Adoption of this method of coil annealing by all strip rolling mills is now only a matter of time, and 1949 should see this process installed in many more plants. Where the pioneers lead, others follow."

Versatile Automatic Gas Cyaniding Furnace Built

MATTHEW H. MAWHINNEY

Salem, O.: "In the experience of the writer, few brand-new ideas have been introduced in the industrial furnace business in 1948. However, several ideas which were new in recent years have shown evidence of sturdy growth, which, after all, is the best measure of their merit.

"One of these ideas is that of high speed heating. As the result of determined pioneering work, a number of installations of considerable size have been or are being built in steel mills, and the results from this quipment will comprise an interesting report for next year. Another such idea is the use of lithium in protecting steel while heated in a furnace, and here again, progress has been made in operating installations using this principle.

"In the field of heat treating, development of the fully automatic gas cyaniding furnace combination for hardening, quenching, and drawing small automotive parts is most interesting, because in each installation so many different heating developments are incorporated. These include gas-tight furnace construction, radiant tube heating, atmosphere generators, convection heating, circulation and cooling of quenching media, automatic handling, and complete electrical interlocking of movements.

"Many unusual inquiries involving temperatures and quantities of heat beyond all previous amounts are resulting from new aviation developments and will undoubtedly result in new concepts in the design of furnaces."

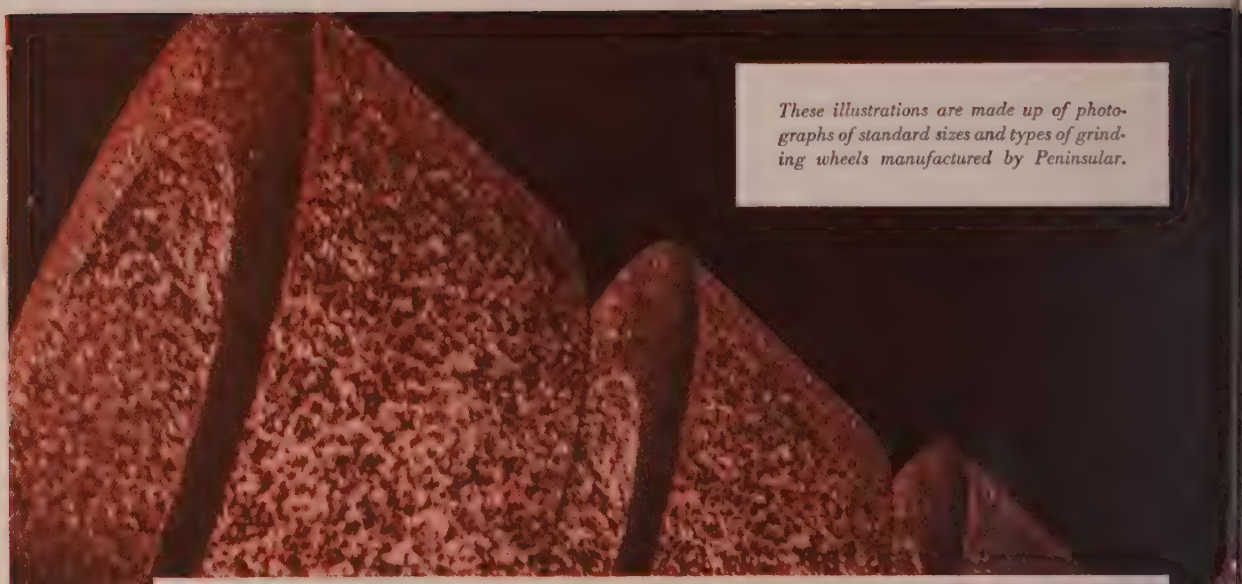
Homogenous Carburizing Finds Practical Applications

E. G. DE CORIOLIS

Director of Research, Surface Combustion Corp., Toledo: "Homogeneous carburizing, which was mentioned in last year's review, has found practical application during 1948. In one particular instance it was utilized in rescuing from the scrap heap a large amount of thin stock which had reached the stage of final heat treatment and had been rejected for nonuniform carbon content. This is another instance of the advantages of carbon control in heat treatment.

"Carbon restoration, which is another phase of the same art, has demonstrated its possibilities in one outstanding installation in the bolt manufacturing industry. In this instance rolled threads from decarburized rod are being restored to full carbon content in the process of hardening, thereby producing a superior and much sought-after product.

"High speed heating for forging has made still further progress through the adoption of gas-fired furnaces which have been developed to the efficiency where they can outmatch the speed of forging equipment. This is accomplished through new methods of burning fuel gas and through the use of new refractories which effectively withstand the high superheat of these furnaces. As a result, forging die life is considerably improved and overall forging cost materially reduced."



These illustrations are made up of photographs of standard sizes and types of grinding wheels manufactured by Peninsular.

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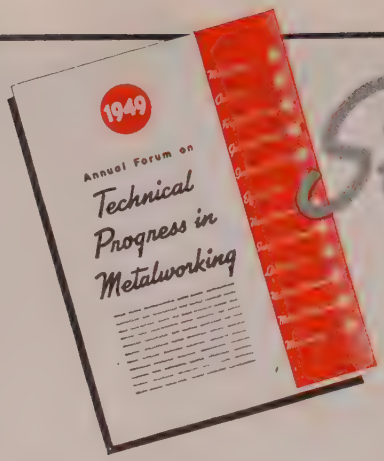


Surface Treatment

Cold drawing of stainless aided by inorganic coating . . . Aluminum alloys create demand for finishes . . . Use of bright plating solutions widens . . . Low-temperature enamels portend new finishing era . . . Fast finishing methods better, more economical

Inorganic Coating Aids Cold Drawing of Stainless

V. M. DARSEY

President, Parker Rust-Proof Co., Detroit: "A chemical process for producing an inorganic, nonmetallic coating on stainless steel to facilitate cold drawing and forming is now in use commercially. The coating adheres tightly to the metal and aids in the retention of lubricants, thereby preventing welding and scoring during the drawing operation. Users report that the treatment is economical and tool and die life is increased along with production and a finer surface finish obtained.

"Wide industrial use is made of phosphate coating for the coating of iron, steel, zinc, and aluminum to inhibit corrosion and improve the durability of applied paint finishes. A recently-developed process is now in use, that produces a coating on steel for increasing adhesion and durability of paint finishes without the formation of a sludge during the coating operations. This feature results in lower maintenance costs because there is no sludge to be removed from processing tanks, no sludge to clog spray nozzles and pipes and no scale to be removed from heating coils. These advantages have been demonstrated in numerous commercial installations."

Use of Aluminum Alloys Creates Demand for Finishes

F. KELLER

Chief, metallography division, Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa.: "Greatly increased use of aluminum alloys for roofing, siding, building facing and store fronts has created a demand for various types of decorative and protective finishes. One interesting development has been the application of a chemical treatment to give a slate-like appearance to roofing and siding for residential applications and to insure more uniform weathering of the surfaces. Another is the development of a clad-type sheet product for spandrels and building facing. This product when treated by the Alumilite process takes a desirable and pleasing anodic coating, which is a neutral gray in color and which blends well with limestone facing and architectural parts.

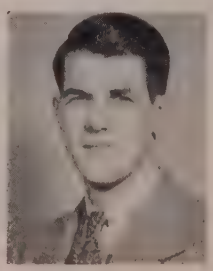
"In the chemical coating field, a treatment of the Alrok type is being used to increase greatly the holding power of aluminum nails. Several new chemical brightening treatments for aluminum have appeared. A commercial treatment of this type is an important addition to the finishes for aluminum and is useful where buffing or electropolishing are not convenient or economical. Considerable progress has been made in the electroplating of aluminum alloys, especially in obtaining improved adhesion of the plating and increased resistance to weathering."

Dross Loss Reduced 50% by Change in Fluxing Technique

W. H. SPOWERS, JR.

Consulting engineer, New York: "It seems that there are still some users who are not availing themselves of the latest developments in the galvanizing process designed to eliminate residuum losses. Dross losses, in many instances, may be cut in half by a simple change in the fluxing technique. The material substituted for this purpose has now reached the sale of some 5 million pounds annually which should indicate a very general recognition of its merits.

"Also, a new material is now on the market for the elimination of zinc skimmings, which is readily and easily adaptable to most galvanizing techniques. It is suggested that the economies effected by the use of these two developments alone will save many a hard-earned dollar from flying out of the galvanizing shop windows."



Use of Titanium Opacified White Enamels Expanded

W. A. DERINGER

Director, ceramic research and development, A. O. Smith Corp., Milwaukee: "The past year has been marked by an expanded use of titanium opacified white enamels at the expense of zirconium and antimony type enamels. Titanium enamels develop opacities of 75 per cent-80 per cent at application weights of 25 to 30 grams (dry) per square foot—considerably

s than the amount required with other white frits. ese new frits also have superior acid and scratch re- tance.

"There is a trend toward using titanium bearing enam- ng iron for some range and refrigerator parts and ap- ring titanium enamels directly to this base metal thout the application of an intermediate ground coat. ltire porcelain enamel industry is suffering from a lack sufficient sheet steel of enameling quality. This has ced manufacturers to use inferior grades of sheet el with the consequent increase in enameling costs.

"Considerable strides have been made by frit manu- cturers during the past year, in developing both ground at and cover coat frits to fire in the temperature range 1300-1350°F."

Fast Finishing Methods Now Cut Costs But Retain Quality

MYRON B. DIGGIN

Technical director, Hanson-Van Winkle-Munning Co., Matawan, N. J.: "In the electroplating industry there is a continued interest in methods for the reduction of costs of polishing and plating, her by the use of automatic equipment or by the full lization of processes and methods heretofore used mmercially to a somewhat limited extent.

"A specific example of cost-saving is in the use of thods for reducing surface roughness of metals by ctrochemical means. These methods include electro- kling and electropolishing the basis metal, electropol- ing the applied deposit, the use of periodic reverse rrent in electroplating and the application of deposits om baths having 'leveling' or 'smoothing' action. With e use of nickel plating solutions showing this char- teristic, a steel surface having an R. M. S. surface ughness reading of 20-22 microinches (which corre- onds roughly to a 150 mesh emery polishing) can be duced to 4-8 R. M. S. with deposits ranging from 0.001 0.003-inch. This approaches a buffed surface which uld have an R. M. S. reading of around 2. The savings polishing and buffing costs are evident.

"Cost advantage also is being obtained by using higher eed cleaning and plating processes which shorten the ting cycle and lower the investment on equipment d anodes."

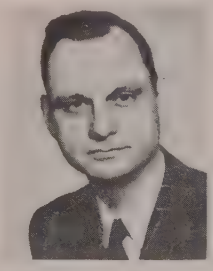
Sees Industry Entering Era Of Greater Competition

C. R. E. MERKLE

Manager Technical sales development, E. I. Du Pont de Nemours & Co., Philadelphia: "Industry generally is facing an era of greater competition. Higher prices and the increasing availability of ny commodities have caused the purchaser to be more criminating, typical of what is referred to as the yers' market'. As a result the buyer today more tically appraises the functioning, design, durability, d appearance of his purchases. This is particularly ie of the so-called durable goods line, such as home pliances, automobiles, etc., most of which are fabri- cated from steel.

"The protective coatings industry is alert to the trend and is concentrating its effort on the enhancement of the value of these products of industry by providing finishes of greater service value and appearance. The development of improved refrigerator finishes and durable automobile finishes of greater beauty, and brilliant metallic enamels are examples of this.

"Of equal importance is the consideration being given to the economics of the use of protective and decorative coatings. Because of the high cost of materials and labor, efforts are being directed to attaining the most economical methods of application. Increased use of mechanized methods of application, such as rollercoating, dipping, and knife coating are being studied. Also being worked on are methods of avoiding overspray and of reducing the consumption of volatile thinner. Among these are spray application in an electrostatic field and the spraying of finishes heated by special equipment."



Greater Use of Bright Plating Solutions Noted

C. B. F. YOUNG

Electrometallurgist, Leonia, N. J.: "Industrial developments are following along patterns established over the last few years. Of noteworthy importance is the greater application of bright plating solutions, for instance, nickel to the production of coatings which require less manual effort but more technical ability in producing. At the same time, there is a demand for heavier cutting, buffing compounds so that greater cuts could be obtained, thereby holding down otherwise spiraling costs.

"Due to the substitution of brains for brawn, the field of metal finishing is attracting the younger men. Emphasis is being placed on education and now the once lowly tank man is endeavoring to gain knowledge and know something about the process that is being used to produce finishing coatings. Papers are being published which show the yearly progress made to make metal finishing an engineering field and not a work of art. The year just ended was marked by the application of bright plating solutions and soluble buffing compounds which decreased the cleaning problem."

Lower Lead Limit Needed for Galvanizing Slab Zinc

WALLACE G. IMHOFF

President, Wallace G. Imhoff Co., Los Angeles: "Years ago, when ASTM drew up the standard specifications for slab zinc for hot dip galvanizing they designated the grade known as 'prime western' grade having a lead content of not over 1.60 per cent and an iron content of 0.08 per cent. At that time the metal lead was lower in price than the metal zinc, and the largest source of slab zinc supply came from the smelting of virgin zinc ores carrying lead. Purpose of setting this high limit of lead was to prohibit the selling of lead at zinc prices. No lower limit for the lead content in prime western zinc for galvanizing has been set.

"During and after World War I the by-products from

hot dip galvanizing increased to such enormous quantities that slab zincs came on the market that also met the standard specifications of slab zinc of prime western grade, but because these zincs came from drosses they did not carry any lead content, or at least a very low lead value, and no cadmium at all. Because no lower limit for the lead content in slab zinc for hot dip galvanizing has ever been set by ASTM, that has given rise to a paradox; namely, prime western zinc may contain up to 1.60 per cent lead or prime western grade slab zinc may not carry any lead.

"Over the years the hot dip galvanizing industry has not generally understood that gradually these two grades of slab zinc have both been on the market as prime western slab zinc. The war, with its abnormal conditions of very high production aggravated a condition which even today is not generally known to the galvanizing industry, namely, that slab zincs that do not carry any lead content, or a very low lead content, tend to greatly increase dross production.

"As a typical example a New England galvanizer had been making 7500 pounds of dross a week, or 15,000 pounds of dross every 2 weeks. His slab zinc specification was changed so that the metal purchased had to carry from 1.00 to 1.25 per cent lead content, or the lead and cadmium content must equal those values, with an average lead content set at 1.00 per cent. Dross content with this new slab zinc carrying the specified lead content, dropped to 2200 pounds of dross every 2 weeks. A saving of 12,800 pounds of dross every 2 weeks. At a zinc value of 96 per cent (most drosses carry an even higher zinc content) that means a saving of 12,288 pounds of zinc every 2 weeks. With slab zinc at 0.15 cents a pound that is a saving of $1843.20 every 2 weeks.

"It is suggested that the American Society for Testing Materials study the effect of lead content of slab zincs for hot dip galvanizing with the idea of revising the prime western slab zinc for galvanizing to include a lower limit of lead content that shall average 1.00 lead, or 1.00 per cent of lead plus cadmium content."

Hard Facing of Parts Affords Longer Life

K. H. KOOPMAN

Development engineer, Linde Air Products Co., New York: "Value of hard-facing becomes more and more apparent to industry as time goes on. Where parts of machines, equipment or tools are subject to localized wear or corrosion, it is advantageous to surface these parts with an appropriate alloy by means of one of several different welding processes. Surfaced parts have lasted from two to forty-four times as long as unsurfaced parts in actual service.

"Cost and maintenance of parts and production shutdown losses can be reduced considerably by extensive use of hard-facing. Parts already worn out may be reclaimed by building up the worn places with weld deposits. The oxyacetylene welding process is normally used to produce the best quality deposits. Metal-arc welding is also widely used because of its rapid rate of weld metal deposition, especially on relatively large masses of metal. However, metal-arc deposits do not have as good quality as oxyacetylene deposits.

"Heliarc welding is rapidly gaining favor in the field of hard-facing. Laboratory and field tests indicate that hard-facing alloys can be Heliarc deposited at rates 2½ times those obtained with metal-arc welding, while at the same time the Heliarc deposits are superior to metal-arc deposits in soundness and alloy content.

"Heliarc deposits on mild steel contain less base metal dilution than metal-arc deposits and only slightly more dilution than oxyacetylene deposits. Heliarc produces less distortion than the oxyacetylene process because the rate of heat input is more rapid. Heliarc therefore offers a happy medium between the oxyacetylene and metal-arc processes with respect to distortion and deposit quality for hard-facing.

"The three most popular alloys for hard-facing steel—namely, the nonferrous cobalt-chromium-tungsten type, the iron-base alloys containing less than 20 per cent alloy additions, and the iron-base alloys containing more than 20 per cent alloy additions—can be deposited with the Heliarc process."

Low-Temperature Enamels Portend New Finishing Era

E. HOGENSON

Executive vice president, Chicago Vitreous Enamel Products Co., Cicero, Ill.: "Selling of porcelain enamel as a finish since the turn of the century has been somewhat of a paradox, in that considerable effort has been decreasing the consumption of it customer by customer.

"In other words, if we look back to the days before World War I, when porcelain enamel was first coming into widespread use as a commercial finish, it will be found that the application weights of the enamels were very heavy. These enamels had low covering power and had to be applied quite thick in order to obtain a satisfactory reflectance. Thicknesses ranged from 0.025 to 0.030-inches.

"During the middle 1930's, a super-opaque porcelain enamel of the antimony type came into being. These enamels produced a satisfactory white appearance in thicknesses ranging from 0.018 to 0.025-inches; and as enamel thicknesses were reduced, resistance to damage during mounting, shipping and use was improved.

"Just prior to World War II, the zirconium type of porcelain enamel, which possesses even better covering power than the super-opaque porcelain enamel of the antimony type, was introduced to industry. The adoption of this type enamel made it possible to produce a porcelain enamel finish in an even thinner coating—0.012 to 0.018 inches.

"Today, in the conventional firing range of porcelain enamels—1500 to 1600° F.—we find another newly developed type of enamel, namely, the titanium opacified type. These enamels have contributed toward reduced thicknesses and produce a satisfactory white appearance at 0.010 to 0.012-inch.

"Today too, an entirely new development has become a reality. This latest development is the maturing of porcelain enamels under the lower thermal critical temperature of low carbon steel, which ranges between 1300 and 1330° F. These low temperature enamels offer such distinct advantages as reduced warpage or distortion of parts caused by a heat reaction during firing operations

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HOT ROLLED STRIP
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SHEET BAR
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BILLETS
BLOOMS
SLABS
PLATES
INGOTS
COOPERAGE HOOP
STRAPPING
OPEN HEARTH STEEL
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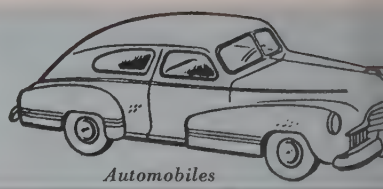
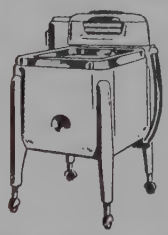
Zinc Coat	X	X	X	
Spring Steel		X		
Terne Coat	X			
Tin Coat	X			
*Fabricated Strip	X	X		
Strapping	X	X		
sheet				
Hot Rolled	X	X	X	
Galvanized	X			
Enamel Sheets	X			
Electrical Sheets	X			
Deoxidized Sheets	X			
Cutlery Sheets		X	X	X
other forms				
†Sheet Bars	X	X	X	X
‡Tubing, Welded	X	X		
†Tube Rounds	X	X	X	
†Billets	X	X	X	X
Blooms	X	X	X	X
Slabs	X	X	X	X
Plates	X	X	X	
Ingots	X	X	X	X



Automobiles

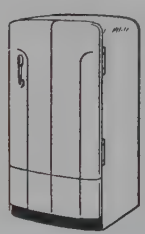
Steel Kitchen Units

Toys



Washing Machines

Heating Equ



Refrigerator Units

Industrial Eq

* — "S" irons (anti-checking) † — semi-finished. ‡ — finished.

Sharon High Tensile Low Alloy Steels

SHARON COR-TEN — The name, derived from two of its principal characteristics, CORrosion and TENsile strength, COR-TEN is used to make lighter products of higher strength than ordinary steel. Particularly adaptable to products where weight and strength are factors (truck bodies, railroad cars, busses, etc.) COR-TEN has high resistance to abrasion and corrosion. It fabricates and welds easily. A relatively low hardenability gives COR-TEN excellent hot forming or hot pressing properties.

SHARON N. A. X. — An all purpose high stre steel that enables manufacturers to build of lighter gaug yet derive even greater product strength. N. A. X. has m features of special interest to designers and builders. N. A has excellent non-corrosion, non-abrasion, and non air- dening qualities. Although copper is one of the ingredi the copper precipitation is negligible. N. A. X. has excel welding properties and exceptionally high resistance to pact and fatigue. It is usually ductile. It is fine grained, st and requires no subsequent treatment after hot workin insure its properties.

COMPLETE STAINLESS STEEL SERVICE

Sharon's line of stainless steels has been produced with an experienced eye to manufacturers' needs. Each grade has been carefully developed to provide the greatest resistance to corrosion, wear, and high temperatures. Sharon — a great name in Steel—an even greater name in Stainless.

STAINLESS

SHARONSTEEL

llurgical Type	Austenitic								Martensitic		Ferritic		Martensitic
SI TYPE	301 (17-7)		302 (18-8)		304 (18-8)		305		410		430		440-B
acteristics and ications	Capable of attaining high tensile strength and ductility by moderate or severe cold working.		Universally known as the "18-8" stainless. Unusual ductility. Excellent for cold forming and deep drawing. Heat resistant.		Carbon limited. Possible to weld in moderate thickness without subsequent heat treatment to restore corrosion resistance. High in alloy content.		Spinning and extra deep drawing. Excellent resistance to corrosion. Easily buffed to finish.		Straight chrome grade. Good for shovel stock, furnace parts, truck bodies, construction equipment. Essentially a deep-hardening grade.		Cold working, excellent corrosion resistance, non-hardening. High acid resistance. Used for tank cars, screening, etc.		Straight chrome — hardenable magnetic. Excellent wearability and abrasion resistance.
nical Composition													
Carbon	0.08/0.20		0.08/0.20		0.08 Max.		.12 Max.		0.15 Max.		0.12 Max.		.75-.95 Max.
Manganese	2.00 max.		2.00 Max.		2.00 Max.		2.00 Max.		1.00 Max.		1.00 Max.		1.0 Max.
Phosphorus	0.04 Max.		0.04 Max.		0.04 Max.		0.04 Max.		0.04 Max.		0.04 Max.		.04 Max.
Sulphur	0.03 Max.		0.03 Max.		0.03 Max.		0.03 Max.		0.03 Max.		0.03 Max.		.04 Max.
Silicon	1.00 Max.		1.00 Max.		1.00 Max.		1.00 Max.		1.00 Max.		1.00 Max.		1.00
Nickel	6.0/8.0		8.0/10.0		8.0/11.0		10.0/13.0		—		—		—
Chromium	16.0/18.0		17.0/19.0		18.0/20.0		17.0/19.0		12.5/13.5		14.0/18.0		16.00/18.00
anical Properties	An-nealed	Cold Worked	An-nealed	Cold Worked	An-nealed	Cold Worked	Annealed		An-nealed	Heat Treated	An-nealed	Cold Worked	Annealed
.Str.(in 1000 lbs. per sq. in.)	110 Max.	110-300	75-95	110-275	75-95	110-275	75-95		65-85	220 Max.	70-90	90-110	—
Str (in 1000 lbs. per sq. in.)	40 Max.	60-250	30-45	60-250	30-45	60-250	30-45		35-45	200 Max.	35-55	80-105	—
ngation % in 2" ga. length	60 Max.	50-2	60-50	50-2	60-50	50-2	60-50		35-20	4%	35-20	25-8	—
nel	155-175	—	135-185	—	135-185	—	135-185		135-165	375	145-185	—	235-260
kwell	B80-90	90RB-45RC	B75-90	90RB-45RC	B75-90	90RB-45RC	75-90RB		B75-85	42RC	B75-90	B90-C23	B93-C20
sion Resistance	Good		Good		Good		Fair		Fair	Good	Fair		Fair
sion Resistance	Note 4		Note 4		Note 4		Note 4		Note 1	Note 1	Note 2		Note 1
aling (Temp. F.)	Rapid Cooling from 1850°-2050°		Rapid Cooling from 1850°-2050°		Rapid Cooling from 1850°-2050°		Rapid Cooling from 1850°-2050°		Cool in air 1350°	Harden at 1775°	Air Cool 1400°-1500°		1650° Cool in furnace
ity (16/cu. in.)	0.29		0.29		0.29		0.29		0.28		0.28		0.28
ng Temp.	1600°		1650°		1650°		1650°		1250°		1400°		1650°
l Forging Temp. Deg. F. Min.)	2100-2300		2100-2300		2100-2300		2100-2300		2000-2200		1900-2050		1900-2050
ning Temp. Deg. F. Min.)	1700		1700		1700		1700		1500		1400		1650
inability	Fair		Fair		Fair		Fair		Good		Good		Fair
Forming	Excellent		Excellent		Excellent		Superior		Fair	No	Fair		Fair
ing	Very Good		Very Good		Very Good		Very Good		Fair	Fair	Fair		Fair
nal Conductivity (BTU/Sq. Ft./Hr.°F./In.)													
200° F.	110		110		110		110		173		181		140
1000° F.	150		150		150		150		199		192		—
icient of Expansion per °F. x 10°)													
0.200° F.	9.4		9.6		9.6		9.6		6.1		5.8		5.6
0.600° F.	9.5		9.9		9.9		9.9		—		—		—
0.1000° F.	10.1		10.2		10.1		10.2		6.7		6.2		—
0.1500° F.	10.7		10.8		10.1		10.4		—		—		—

Above figures are approximate to help you select correct stainless to do the job.
Minimum elongation varies with thickness of strip.

CORROSION TABLE

OTE 1—Resists atmosphere, fresh water, mine-water, steam, carbonic acid, crude oil, gasoline, blood, perspiration, alcohol, mercury, soap and sugar solutions. For best results, a high finish is desirable.

OTE 2—Same as Note 1 but with greater factor of safety.

OTE 3—In addition to corrosive elements in Note 1, resists salt spray, all foodstuffs, practically all organic chemicals and acids, many fused salts and molten non-ferrous metals.

NOTE 4—In addition to Note 3, shows greater resistance to stronger mineral acids and solutions of their salts. This is the most corrosion-resisting steel in general use.

NOTE 5—Resist corrosion and heat to a degree intermediate between that of plain steel and the higher chromium and chrome nickle steels.

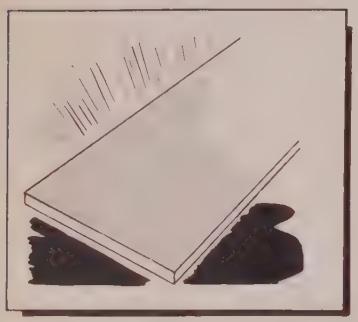
NNSYLVANIA •

SHARON STEEL CORPORATION

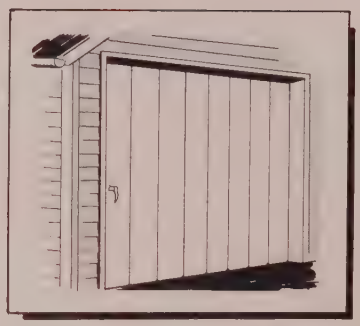
GALVANITE

SHARONSTEEL

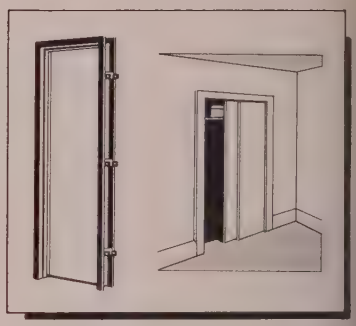
A SUPERIOR DEEP DRAWING, RUST COMBATTING COATED STEEL.



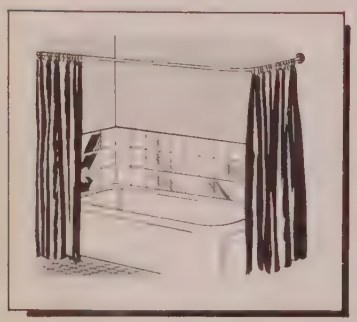
ZINC COATED — Galvanite is a special zinc coated product. The protective Galvanite coating is perfectly bonded with the quality Sharon strip steel that forms the base.



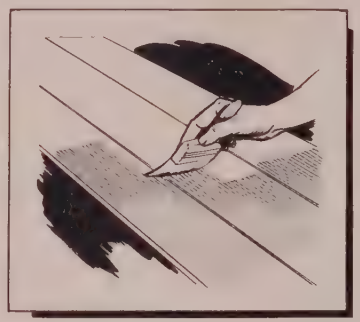
GALVANITE LIKES THE WEATHER TOUGH — Rain, snow — sleet and slush cannot penetrate the bonded zinc coating — and the strong steel base offers a lifetime of wear even under the hardest usage.



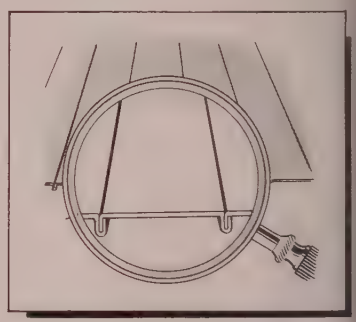
APPROVED BY LEADING CODES — Galvanite has been given the green light under the strictest of building codes. A recent test in an area plagued with oceanic salt spray proved Galvanite resistant to salt corrosion.



WHERE DAMPNESS PREVAILS — Where water and dampness are an every hour occasion Galvanite can't be beat. And products made of Galvanite can be produced at lower costs — because Galvanite — for all its advantages — is truly inexpensive.



IDEAL FOR PAINTING — Galvanite provides an ideal "mat" base for painting, and baked enameling. It withstands temperatures up to 750° without deteriorating.



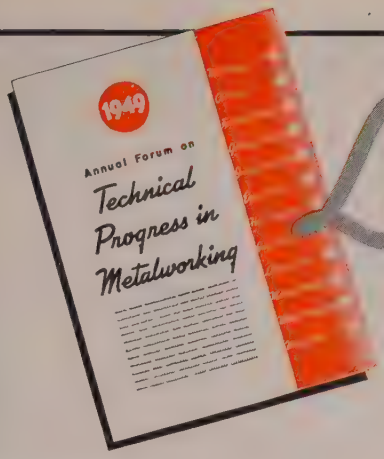
SEVERE FORMING and DRAWING — Galvanite will not peel, flake or powder during difficult fabrication. It is especially suitable where a coated strip must withstand severe forming and drawing.

Sharonsteel Products Company is a warehousing company maintaining complete steel stocks in Dearborn, Michigan, and Farrell, Pennsylvania to better service industry.

Dearborn Area	*Farrell Area*
Phone—Tiffany 6-1800	Phone 6561

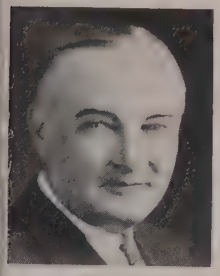
SHARON STEEL CORPORATION

SHARON, PENNSYLVANIA



Lubrication

Advanced mechanization demands "tailored" lubricants . . . Palm oil substitute imminent . . . Centralized systems facilitate lubricating job . . . Evaluation of drawing compounds result in improved products . . . Surface active lubricants afford good rust protection



Mechanized Advances Demand Use of Scientific Lubrication

JOSEPH A. RIGBY

Manager, engineering and sales, Brooks Oil Co., Pittsburgh: "In this era of mechanization with astounding developments in machines for increased production and more economical operations, technological and designing groups are more intensive, ingenious and aggressive each year.

"Lubrication is a major problem for successful accomplishments of mechanized improvements, so much so that design is now incorporating scientific principles, not only for the application of lubricants but with a viewpoint of keeping up with advancements in lubricants having characteristics to meet exacting and severe service. No longer does the problem prevail of a machine designed with the puzzling problem of the operator being dared to lubricate it.

"The petroleum industry, being keenly aware of the trend, has kept pace and developed lubricants, chiefly of compounded nature, for satisfactory performance. These are results of laboratory study and actual performance.

"Available are compounds for hydraulic service which are repellent of moisture, nonfoaming, resistant to oxidation and sludging, stabile, with extreme pressure characteristics for enduring service and of positive protective nature against corrosion. Others are water repellent microfilm machine tool ways lubricants, open gear compounds extending service many times and enclosed gear lubricants repellent to moisture together with positive enduring film strength for 15 to 20 years of continuous service."

Rust Preventive Soluble Cutting Oils Available

A. B. CULBERTSON

Manager, products application department, Shell Oil Co. Inc., New York: "Interest in inhibited transformer oils continues to grow as shown by the recent development of an oil containing an oxidation inhibitor which delays the onset of acid and sludge formation and thereby extends service life of the oil.

"Rust preventive soluble cutting oils represent the latest development in cutting oils for ferrous metals. Use of these protects the work piece between operations without special treatment to prevent rusting.

"As a result of extensive research, there has been considerable improvement in fluids for torque converters and fluid couplings. Such improvements consist of increased oil life through the addition of fortifying agents to special base stocks which counteract lacquer and sludging resulting from oxidation. In addition, additives are used to resist rust or corrosion, foaming, and wax formation at low temperatures."

Surface Active Lubricants Afford Good Rust Protection

GEORGE H. VON FUCHS

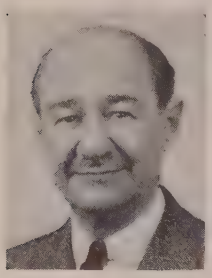
Consulting chemical engineer, Niagara Falls, N. Y.: "Emphasis placed in recent years on the rust preventive action of turbine oils has opened up an entirely new field for the development of industrial lubricants. Rusting of machinery under operating conditions has frequently not been recognized as such and was often mistaken for wear. In idle equipment, rusting may occur even during a week-end shut down if the lubricant lacks surface activity and drains off or is displaced by condensation of water.

"When such equipment is again started up, the rust wears off. Typical cases are reduction gears and antifriction bearings. The red (ferric) or black (magnetic) iron oxides dispersed in the oil act as abrasives and further accelerated wear. There is strong evidence that the increased rate of wear often observed with internal combustion engines under low temperature operating conditions is also due to rusting. In this case, the water soluble acidic oxidation or decomposition products of the fuel, as well as of the lubricant, further aggravate the situation.

"Modern methods of processing at times create abnormally severe rusting conditions for metal working machinery, resulting in frequent overhauls and replacement of parts. The solution of the problem is to employ surface active lubricants which are able to coat metal surfaces and to form and maintain a water repellent film which protects the lubricated surfaces against rusting. Such lubricants also improve the mechanical performance of the machinery by eliminating chattering and consequent vibration and assuring smooth operation, thus further protecting the machinery and greatly extending its useful service life.

"Considerable discretion is necessary on the part of the oil manufacturer, as well as the user, in preparing and in selecting surface active lubricants. Many so-called rust preventives and other oil additives actually promote

rusting or sludging in service. Some base oils do not properly respond to addition agents; they have poor additive susceptibility. The resulting blend will fail and may be worse than uncompounded oils. However, even with the best base oil, the type, concentration and compatibility of oil additives should be such that the resulting blend will accomplish the protective purpose without interfering with any other of the essential functions or service characteristics of the lubricant."



Lubricating Job Reduced by Centralized Oiling Systems

E. J. EHRET

The Farval Corp., Cleveland: "Given the finest equipment possible to design, what happens without lubrication?—Breakdown, lost production, increased cost and a shop full of repair work; and who is supposed to prevent all of the above? The oiler, the lowest paid man on the staff. If we only realized it, he has more to do with keeping the wheels going than anyone else in the plant. Many plants have organized lubrication departments to see that the correct lubricants are purchased and that modern tools are provided for applying lubricant.

"Times have changed; men have changed, so methods must change along with everything else. In the past 20 years, centralized lubricating systems have contributed a great deal to our processes for eliminating the hazards of hand oiling and reducing the lubrication job to a point where it can be handled properly. Centralized lubricating systems keep the wheels of industry turning."

Study of Drawing Compounds Results in Improved Products

D. J. RICHARDS

Vice president—sales, E. F. Houghton & Co., Philadelphia: "In the field of metal working products in which our company has specialized for a great many years, many developments took place during the war production period. With the return of mass production for peace-time purposes, there have naturally been a number of trouble spots in metal working plants, many of which are being ironed out through co-operation between the manufacturers and the suppliers of processing products.

"One of these problems which became apparent more than a year ago was the need for a re-evaluation of drawing compounds used to lubricate dies so that parts could be made without delay, at lower cost and with a minimum of rejects. We have undertaken a study of the entire line of drawing compounds for press, tube and wire drawing during the year just closed. This required the evaluation of a great variety of formulae used by us and by others over past years.

"A great variation in content of various ingredients has existed. Moisture content of the compounds which we have studied range from one to as high as seventy per cent. Soap content varied from one to twenty per cent. Unsaponifiable content varied from 0.3 to 55 per cent and free fatty acid from 0.14 to 6.2 per cent. Pigment content on the products of our own and competitive manufacture range from 14 to 50 per cent. The survey, incidentally, indicated a trend away from pigmented compounds to simplify cleaning after the draw.

"Some drawing compounds were formerly rather unstable products, tending to develop unpleasant odors and employing low grade fats and oils. In an effort to arrive at a lower price, many suppliers found it necessary to reduce the quality of the ingredients used in these die lubricants. Often, a compromise is necessary in order to keep the cost within reason.

"One fact stands out from our study of the drawing compound market; that is, that a drawing compound is often blamed for failure to produce smoothly formed parts out of sheet stock when the dies themselves do not synchronize and mate well. It has frequently been noted that the compound which appears to fail on a new set of dies will work perfectly after the dies are well broken in. It is urged that drawing shops give the lubricant a chance rather than condemn it for failure to overcome irregularities of new dies.

"Our company expects to announce a new line of drawing lubricants early this year, based on the year's investigation now being concluded.

"Closely allied to the drawing problem is that of lubricating molds in die casting machines. A new product has been developed of a paste consistency which contains aluminum powder; therefore, has a silvery color which simplifies the cleaning problem, as compared with black, oily lubricants previously supplied. It has been found that the use of Mouldlubric No. 306 has resulted in twice the life of plunger tips and dies and a very great reduction in scrap and in cleaning time."

Palm Oil Substitute Appears Imminent

E. L. H. BASTIAN

Staff engineer, lubricants department, Shell Oil Co., New York: "Development of new and improved steel mill lubricants and other petroleum derived products for better fabrication and finishing of steel is being given concentrated attention in the industry.

"Several such developments of unusual interest are in the fields of hot dip tinning and of forming and finishing stainless steels.

"Current industry attention to new materials as replacement products for palm oil, traditionally used for years in the hot dip tinning and cold rolling of steel, emphasizes the importance of this work in which we have been actively engaged for over 5 years. Progress in this development appears to warrant early announcement of new improved products, particularly for hot dip tinning purposes. In many respects, these new tinning oils show operating advantages over palm oil previously used, and have the strategic advantage of ready availability for domestic supply under any foreseeable circumstances.

"Considerable attention has been given during the past year to new lubricants for forming, drawing, and finishing of stainless steel in tube, rod and sheet form.

"Progress in this work has been very promising to date in developing drawing lubricants which not only facilitate drawing of this metal but are also reasonably easy to remove from the finished piece. This feature, as

This special "Inductomatic" machine at the Salisbury Axle Plant is powered by two 125 KW, 10,000 cycle TOCCO Induction Heating Units.

By TOCCO* Induction Hardening of Axle Shafts

WHAT progressive engineers at the Salisbury Axle Division of Dana Corporation have done with Induction Heating for hardening automotive axle shafts suggests comparable savings for your products. Note this report:

SAVINGS of $375.00 per day caused by increased output and switch from SAE 4140 to SAE 1033 steel made possible by induction hardening.

LESS MACHINING time because shaft of SAE 1033 steel is completely machined prior to hardening. Tool cost cut in half—turning time reduced from 2 minutes to 30 seconds.

PRODUCTION DOUBLED. Formerly 50 axle shafts per hour with conventional combustion type heating—now 120 per hour with TOCCO.

PRODUCT IMPROVED. Torsional fatigue has increased 200%. The shaft is no longer a compromise between durability and machinability. It is hardened to 55 RC and drawn back to 43-47 RC. Degree of hardness and depth is accurately controlled.

TOCCO Engineers will gladly survey *your* operations for similar cost-cutting results in hardening, heat-treating or brazing—without obligation.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg U. S. Pat. Off.

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FREE BULLETIN

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Dept. S-1, Cleveland 1, Ohio

Please send copy of new bulletin. *"Principles of TOCCO Induction Hardening and Heat Treating".*

Name _____
Position _____
Company _____
Address _____
City _____ Zone ____ State _____

against the laborious and costly cleaning methods necessary with soft metal and other types of coatings used to draw stainless, makes these products of significant interest to industry people working on stainless steel."

Trend to Multiple Units in Central System Setups

H. V. MILES

Manager of research and development, Honan-Crane Corp., Lebanon, Ind.: "During the past year, the oil purification industry has made significant strides in effecting notable savings for many manufacturers in the metal-working industry. The trend has been toward central system installations when a number of units are involved such as with hydraulic presses, automatic screw machines, grinders, etc. The major objective has been to cut high maintenance costs attendant with machining operations that require sump cleaning, coolant placement or sludge removal. Aside from this, importance of clean oil and clean coolant to efficient, trouble-free operation has served to further emphasize the need for installing equipment for continuous conditioning.

"It is expected that more and more attention will be given in the coming year not only to central systems but also to the multitude of other applications where appreciable savings can be realized through reduced maintenance, less down-time and more economical operation. The oil purification industry is striving to provide equipment of even greater efficiency with particular emphasis on the development of lower cost filter media."

Purchasing of Lubricants Can Be Simplified

J. G. O'NEILL, JR.

Sinclair Refining Co., New York: "Industry is conscious of the advantages accruing from simplification in the number of lubricating oils. Individual plants, however, often encounter difficulties in obtaining this simplification, the reason being the many ways both the oil industry and the machinery manufacturer have of identifying the various lubricating oils both as to quality and viscosity.

"In attempting simplification, industry encounters brand names, viscosities at either 100°F, 130°F or 210°F. In addition there are SAE grades and AGMA numbers. Also there are wide ranges of recommendations by manufacturers of machinery. Again there are additive oils, and nonadditive oils. They are also derived from different crudes and refined in different ways making the resultant oils different in their characteristics. Altogether the problem of combining all the different factors appears very complex.

"Actually, engineers in industrial plants can readily solve this simplification problem. First, for the most critical units such as a steam turbine or large hydraulic unit, determine from the machinery manufacturer and the oil supplier the most efficient lubricating oils by brand names. After the oils are selected, obtain from the oil supplier the viscosity at 100°F and 210°F and the SAE grades under which they classify with their AGMA numbers. With this information and knowing that the oils are of a quality to suit the most severe circulating type service, they can be fitted, through their identifications, to the other services where a circulating oil is required. Where unusual or special operating conditions exist in a specific unit, the oil supplier should be consulted.

"For example, a steam turbine with ring oiled bearings, may require, according to the manufacturers, an additive steam turbine oil of about 300 seconds viscosity at 100°F. This oil is then purchased but it also has other applications. The oil supplier then advises that it is in addition an SAE 20 and an AGMA No. 2. It can then be used in an air compressor requiring an SAE 20 and in a gear reducer requiring an AGMA No. 2. In addition, it may be used in gear and piston type hydraulic pumps (from 120°F to 180°F), in high speed chain belt drives (from 120°F to 180°F), steam engine circulating systems, roller and silent chains and general lubrication on stokers, external lubrication of steam engines and steam pumps, automatic systems and general lubrication of slides, ways and bearings etc. on machine tools, oil lubricated shaft bearings, medium speed chain belt drives (0°F to 180°F) and chain belt drives at slow speeds from 0°F to 180°F etc. It can be seen that this one oil has a wide field of application and is not limited to the one steam turbine usage.

"This same procedure can be followed with other oils resulting in a marked decrease in the number of oils in usage."

Industrial Leadership Developed Through Education

WALTER J. BROOKING

Dean, LeTourneau Technical Institute, Longview, Texas: "It is not commonly understood even in industry that one out of every four people gainfully employed in the United States earns his living from manufacturing industry. This does not include sales, service and allied activities, but actual manufacturing, according to the Statistical Abstract of the United States. Among the planners, supervisors, and foremen who direct the efforts of this large group of people is a preponderance of men with less than a high school education. A study by the American Foremen's Association shows that only 7 per cent completed a college education.

"For men on the job growing in industrial responsibility there are two especially important sources of information the use of which the managers of industry should encourage. One is the reading of trade journals. The other is active membership and careful reading of the literature of technical societies dedicated to the technical betterment of their members and the advancement of the arts and sciences associated with their specialty.

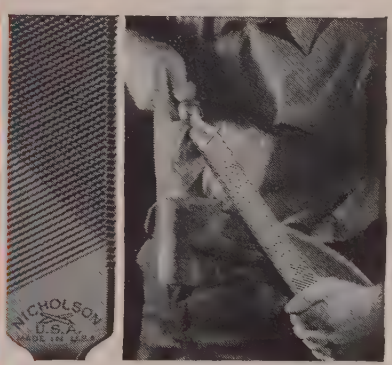
"Aside from part-time formal school study these two sources of ideas and technical information provide the most ready source of important current information in the most usable and practical form. They are the most widely used literature in the fields of technical and supervisory industrial management. The encouragement of young people in industry to use them regularly and often is probably the quickest way to give the leaders of tomorrow the vision of the importance of an informed industrial management and a reliable source of information.

"Nowhere in the areas of endeavor in our American way of living is there a greater need for informed leadership than in manufacturing industry, and nowhere will a studied effort at self-improvement sponsored by management pay more lucrative rewards in the future."

Best Wishes
for better filing in 1949

STAINLESS STEEL FILE. Special-shape teeth to withstand high abrasive action of the tough chromium carbides and nickel alloy. Same types and sizes as regular-purpose files.

BRASS FILE. Short-angle "upcut" teeth prevent file running off work and keep file clear. Long-angle "overcut" breaks up filings. Flat and Half Round shapes, 8" to 12".



FOUNDRY FILE. Has extra-rugged teeth to resist breaking out. For fast metal removal on castings. Available in Flat and Half Round shapes, 8" to 14".

ALUMINUM "A" FILE. Special serrated-tooth and "open-throat" cut – to prevent clogging. For filing aluminum and other ductile metals. Flat and Half Round, 6" to 14".

IT ISN'T the cost of the file but the cost of the workman's time that counts in files and filing operations. Selecting *The right file for the job* is very important. Not only does it save time but it increases efficiency and reduces rejects.

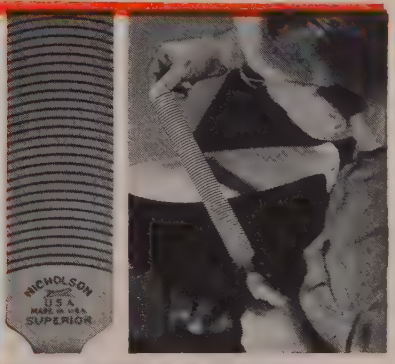
Make your industrial distributor a helpful consultant on files as well as your supplier. *And be sure to send for "FILE FILOSOPHY"—48 intensely interesting pages on files. Every shop foreman needs a copy.*

NICHOLSON FILE COMPANY
71 Acorn St.
Providence 1, R. I.

LEAD FLOAT. Has coarse, short-angle teeth – a series of stubby "blades" which shear or "float" away metal. For lead, babbitt, pure copper. Flat and Half Round shapes.

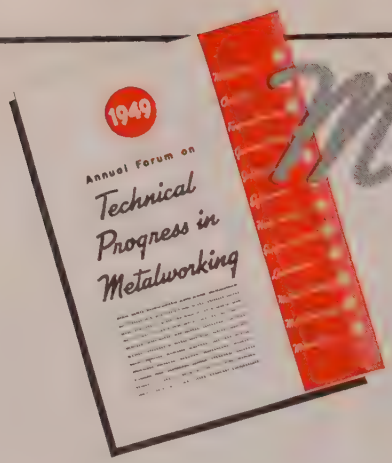
SUPER-SHEAR FILE. An exclusive milled curved-tooth file with teeth in off-center arcs, for roughing and smoothing in one operation. Serrations break up filings. 8" to 14" lengths.

LONG ANGLE LATHE FILE. Teeth cut for clean-shearing—for fast, smooth finishing under light pressure. Made single cut on flat blanks in 6" to 14" lengths.



MILLED CURVED TOOTH FILE. Matchless in workmanship. Proper tooth face and rounded gullets minimize clogging. Shoulders lower than tooth tops permit use as surfacing tool.

NICHOLSON FILES *FOR EVERY PURPOSE*



Materials Handling

Demand for better handling methods to continue this year . . . Rigid "packaging" shrinks carrier damage claims . . . Scale models aid in pre-arranging plants . . . Handling savings increasingly recognized by management . . . Unit loads cut outside distribution costs

Demand for Better Handling Methods To Continue in 1949

F. E. MOORE

Chairman of the board, Mathews Conveyer Co., Ellwood City, Pa.: "Considerable attention is being focused on materials handling methods. Every manufacturer must deal with rising production costs, and is seeking methods which will keep his handling time at a very minimum. This situation has resulted in considerable activity for conveying equipment manufacturers, and its influence will likely continue to be felt during the year ahead. Requirements for conveying equipment used in metal producing and processing plants will probably continue to be fairly heavy. This could likewise be true in the case of our larger steel, grey iron and nonferrous foundries.

"I believe that there is still a substantial amount of system work in the engineering departments of most conveyers manufacturers. This would indicate that the greater part of 1949 will find these people quite busy. We would hesitate right now to forecast conditions in the industry beyond that time."

Truck Versatility Helps Expand Mechanization of Plant Handling

E. F. TWYMAN

General manager, Automatic Transportation Co., Chicago: "Two important trends in materials handling, which will have major influence in determining the course of future design and production of industrial trucks, are making themselves felt throughout the field. These are the definite expansion of demand for lighter materials handling equipment; and a growing emphasis on versatility in industrial trucks.

"By meeting these requirements with appropriate equipment, we are making possible the mechanization of materials handling operations where modern scientific methods were not, heretofore, thought to be applicable. In addition, industry is seeking, and we are providing attachments and devices to perform specific handling assignments not possible with standard machines.

"These trends mean one thing: Materials handling as an industry, and as a contributor to industry in general, is continuing to grow. It is expanding into broad fields where it has not, until now, been accepted as an essential part of the overall process of production and distribution.

"The outlook for the industrial truck industry, based on management's increasing awareness of the wastefulness of uneconomic, inefficient materials handling methods, is brighter than it has ever been before."

Operating Costs Affect Choice of Motive Power

C. B. COOK

Vice president, Elwell-Parker Electric Co., Cleveland: "Lack of suitable available labor set 1948 apart as the year in which a decided swing to electric industrial trucks took place. In 1948, misapplied wartime trucks, installed on account of restricted choice during that period, were replaced.

"More careful scrutiny of operating costs is also affecting the choice of motive power. Likewise, fork trucks, even with their multiplicity of auxiliary equipment, are not being accepted without first considering the high lift platform system of handling, which involves the use of lesser weight trucks of the same capacity as fork trucks. This obtains for floor and elevator loadings, the total weight of truck with pay load. The paper industry will probably be found to have made greater progress in equipping and approaching saturation with electric industrial trucks than any of the other process industries, or even the iron and steel industry with its greater product density."

Materials Handling People See Responsibility in Our Economy

J. W. WUNSCH

President, Silent Hoist & Crane Co. Inc., Brooklyn: "I preface my comment with a 'plug' for the Material Handling Institute. It is my view that the organization of this national society, sponsored by the manufacturers of material handling equipment, for the advancement of the art and science of material handling, is a development which will profit very nearly all industries in the American economy. The educa-

tional program, to bring information to the user and bring the experience of the user to our industry, for the good of all concerned, will be accomplished through the close and active co-operation with local material handling societies. Many of these organizations are functioning in many of the principal industrial centers in the United States, as chapters of the Material Handling Institute.

"This organization is a sure manifestation that the materials handling industry recognized its important position in our national economy, and the responsibility that goes with it. A most important project in the technological development of the industry is standardization in the best sense of the term. Not standardization to stultify and discourage initiative of design, not to achieve a superficial uniformity but standardization to establish engineering standards for minimum quality, standards to provide the maximum degree of interchangeability of components and auxiliary equipment. Not least, standards that will reduce the cost of production of the equipment. Such standardization as I have in mind, is now being avidly developed, by our armed forces to reduce to a minimum the problem of service and maintenance, as a result of their experience in the past war. The problem of service and maintenance is only less important to the industrial user of material handling equipment."

Rigid "Packaging" Shrinks Transportation Damage Claims

ADOLF LARSEN

Vice president sales, Gerrard Steel Strapping Co., Chicago: "Steel plays an important and growing role in the advancement of materials handling. Steel and wire pallets are used in many handling programs and part of their success in new and simplified packaging is round steel strapping which is extensively used for binding and holding compactly the individual units stacked or piled on these pallets.

"The pallet method of shipping all types of merchandise has many advantages over shipments of individual units. The savings are in labor costs and easier inventory control, besides a reduction in transportation damage claims. Palletizing assures arrival of goods in usable condition at final destination.

"Round steel strapping holds units to these pallets tightly making the entire lot a rigid structure, easily handled and transported and not easily susceptible to breakage."

Manual Handling Priced Out of Market

L. M. SEARS

President, Towmotor Corp., Cleveland: "As the nation heads into the most promising and challenging era of all times—that of rebuilding a war-torn world—few businesses are so fortunately situated both competitivewise and marketwise, as are industrial fork lift truck manufacturers. While many industries have run into major competition from outside their own field, the industrial fork truck manufacturer faces no serious competition from outside sources. Our chief competition in the mass handling of materials—manual labor—has to a great extent priced itself out of the market.

"From the standpoint of market potentials, 1949 likewise promises to bring forth a continued and impressive growth in our business, restricted only by production facilities, supplies of steel and other components available. In fact, it is my opinion that the industrial fork lift truck industry is still only in its pioneering stage. The expanded use of industrial fork trucks for speeding up the flow of materials in and around production lines, warehouses, shipping docks and other departments is limited only by the resourcefulness and imagination of plant sutendents and engineers.

"Possibilities for greater use of industrial fork lift trucks equipped with special accesseries are almost limitless. We expect to accelerate the development of these accessories along these same lines for years to come. We will likewise continue to disseminate information on the results of comparative time-study findings which prove to cost-conscious and profit-minded business management the time, labor and cost-saving advantages of mechanized handling over manual methods.

"One of the most encouraging signs foretelling the tremendous growth in the adoption of mechanized handling is the response our company received when we first introduced an accurately-designed quarter-inch scale model of our industrial fork lift truck. There is a big future for scale-model equipment in experimenting with materials flow in the blueprint stage of plant construction."

Power Shovel Users Find Larger Machines Cut Cost

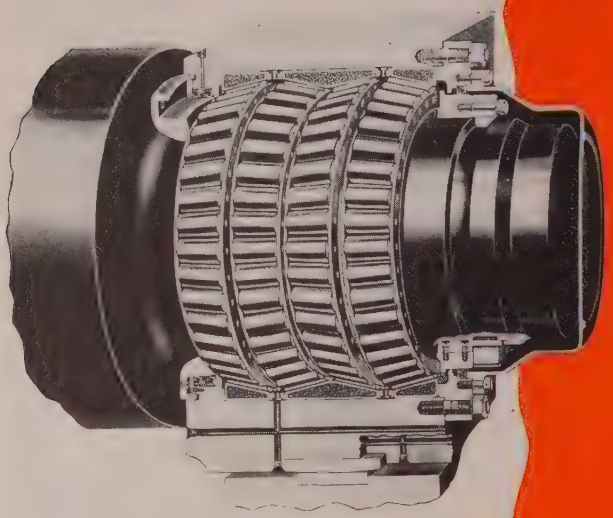
FRED L. WHITE

Chief engineer, Osgood Co., Marion, O.: "In the power shovel and crane field, we have noted a tendency or trend toward the use of larger machines in all phases of work. There is still a ready market for the small half-yard machines for use by small contractors, but in such lines as road contracting for example, the tendency is to get to two and one-half yard or larger machines. The only limitation on the size of these machines is the transportation of the machines from one job to another.

"New and larger trailers are being built from time to time and it is wholly a matter of getting a trailer with tires to carry the weight of these larger machines on the highways. It is no more costly from the standpoint of labor to operate a two and one-half yard machine than a one-yard and, of course, the quantity of work done is much greater. There is a very distinct trend toward the larger machines, those mounted on crawlers, but there is also a tendency to build the larger truck cranes and rubber mounted rigs.

"The above also holds true for such industries as coal stripping, whereas they formerly used one and one-half and two-yard draglines with booms up to 70 feet long they now go up to crawler mounted rigs of three and three and one-half yard capacity, and many of the larger walking type draglines, of five and seven and one-half yard capacity. A few up to twenty-five-yard capacity

HIGHER ROLLING MILL SPEEDS WITH GREATER MILL RIGIDITY



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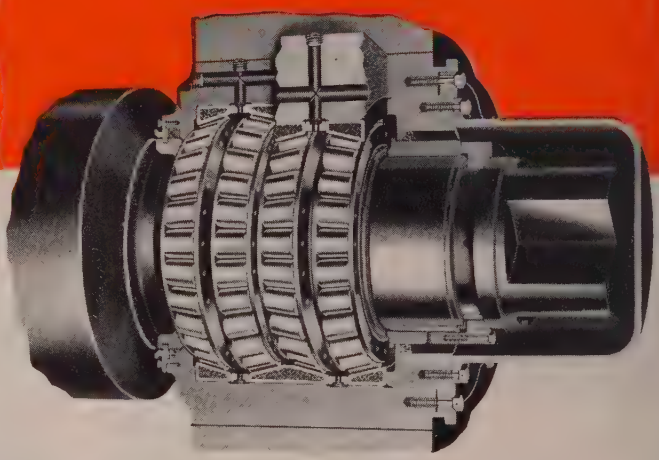


Yesterday

As rolling speeds and loads go higher and higher, the necessity for increased mill rigidity becomes greater and greater.

Timken Balanced Proportion rolling mill bearings are definite factors of high speed mill operation because they eliminate roll neck friction. They make possible more rigid mills because balanced proportion design permits larger diameter roll necks than were possible with previous designs of tapered roller mill bearings.

No separate thrust members are required with Timken roll neck bearings. All loads — radial, thrust and both combined — are efficiently handled within the geometry of the bearing.

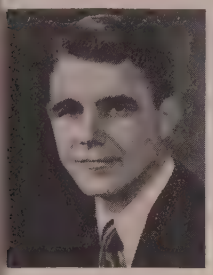
No complicated lubricating systems are needed with Timken roll neck bearings. Roll changing is simplified. Maintenance is reduced.

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
ROLL NECK BEARINGS

Past performance proves that the tonnage life expectancy of Timken roll neck bearings is greater than that of any other bearings used on mill roll necks. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

also are now in use. The entire industry is tending to produce larger machines of this class because of the mounting labor costs, and the fact that so much more can be done wherever it is practical to use such a machine."



High Production "Tools" Only Road to Economic Stability

JERVIS C. WEBB

Treasurer and general manager, Jervis B. Webb Conveyor Co., Detroit: "The need of greater production, and the payment of high wages, can only be realized by putting in the hands of the worker the tools with which to produce the goods and earn the wage.

"Materials handling is one of the biggest contributing factors to the successful reaping of the benefits of technological advancement by which more people have more things; and a higher scale of living is obtained. The savings of proper materials handling is getting greater recognition than ever before, and becoming a powerful factor in realizing economic stability."

Management Now Recognizing Materials Handling Savings

R. W. MALLICK

On leave of absence from Westinghouse Electric Corp., Pittsburgh: "Top management throughout industry has begun to focus its attention on material handling costs. In some instances this has not been a conscious effort, but has rather been the result of pressures disguised in other forms. Most noteworthy has been the desire to raise the levels of manhour output due to high wage rates. The other has been the desire to alleviate the burden inflicted by extremely high cost of material handling labor. Industry has been complacent to this latter element until the war-inspired wage boosts forced the issue.

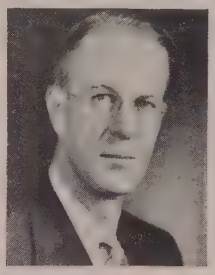
"Most recent developments of note has been the sudden decision to shift plants presumedly due to the recent ruling on F.O.B. pricing of steel. Actually, in final analysis this resolves itself into a material handling problem. In some of the studies, cost figures are revealing that savings gained from avoiding shipment of huge tonnages of material that ultimately results in scrap, due to processing shrinkages, are in themselves gratifying.

"We have not yet fully learned to appreciate that there are only three basic operations in converting materials—processing—assembling and material handling. Dun & Bradstreet's recent survey of industry indicates, however, that we are adding to our education quite fast. Just as soon as we develop a sound and simple approach to the problem of enlightened cost analysis and accounting in matters of material handling costs, we will have passed another mile post in our continued drive for more efficient production at lower cost.

"Within the past year the Material Handling Institute has sponsored the formation of 10 local chapters of the Material Handling Society and plans are well underway for the formation on a national basis of the American Material Handling Society. This will be a tremendous step forward in the further development of material handling practices.

"Efforts of the instiute and the splendid work done by technical magazines, societies and trade journals in spreading the gospel of improved handling techniques and of general education in the field are reaping the dividends of progress.

"Industrial engineers and cost analysts had best prepare to answer the 'boss man's' sure to come inquiry into material handling costs."



Outside Distribution Costs Reduced by Unit Loads

C. F. KELLS

Managing director, Electric Industrial Truck Association, Long Island City, N. Y.: "Unit load methods are being used in increasing ways to solve industrial handling problems. During 1948 a conviction spread that they can and should be more universally applied to reduce rapidly rising costs of distributing products of industry.

"The unit load method consists of mechanized, mobile handling of loads in units that are several times larger than can be handled by manual methods. Although mechanization has been universally adopted for production processes and transportation, its possibilities have been only partially exploited in physical distribution at points of transfer, storage and shipment breakdowns.

"Repeated handling, which mounts costs alarmingly, now makes physical distribution a major problem of management, and one of the most susceptible to improvement of all industrial functions. Cost conscious managements are insisting that efficiency of handling during distribution equal that achieved by unit load handling on their production lines.

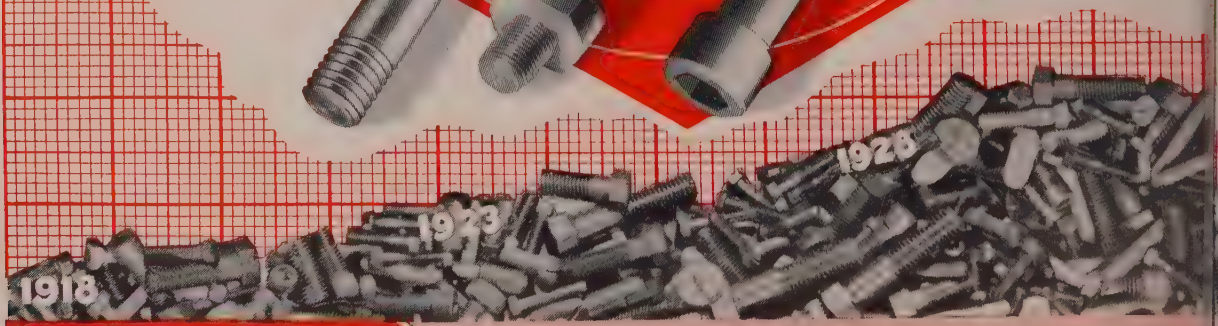
"Increasing ways of using unit load methods effectively in distribution are being developed. Principal problem seems to be to develop ways of dividing costs and savings equitably among those who benefit. In many instances of mutual benefits, individual problems have been solved by direct negotiation between manufacturers and their suppliers and customers.

"Other individual problems have been partially solved by developments in methods of unitizing loads, in packaging methods, and industrial truck accessory devices, which either make an investment in pallets unnecessary or permit retrieving pallets easily when unit loads are placed in common carriers. The latter, of course, does not contribute to economy in distribution.

"Experience now demonstrates that if more commodities in transit were handled in unit loads, the economies that have been achieved within manufacturing plants by unit load methods can be achieved at all transfer points between producers and consumers. Benefits include smaller investment in storage space, less loss and damage, fewer delivery trucks because of reduced loading and unloading time, better personnel relations, fewer accidents and other indirect advantages.

"The more widespread the use of unit load methods, the easier it is becoming to apply them where mutual benefits result, and the more attention industry is giving to their possibilities. This year will see still further development of unit load principles in connection with industrial trucks."

The 30 years of Top Quality Cleveland Fasteners mean something Important to you



CLEVELAND
Top Quality
FASTENERS

The Cleveland Cap Screw Company

2917 East 79th Street • Cleveland 4, Ohio
VUlcan 3-3700 TWX CV42

***This is the Cleveland Cap Screw Company story*—of phenomenal growth due to the 4-part business formula we've stuck to through thick and thin, by which our customers and distributors profit.**

1. TOP QUALITY FASTENERS

Being alert to better methods and improved facilities. Development of the Kaufman Process *in our plant*—providing new toughness and uniform accuracy by single and double extrusion. And we concentrate on making a *few* items *well.*

2. SERVICE

Making an abused word *mean* something. We're not perfect, but your "wanted dates" are our bosses. Not big—we can be *flexible.* Growth chart below proves customer satisfaction—sales increases continuing even *after* war period.

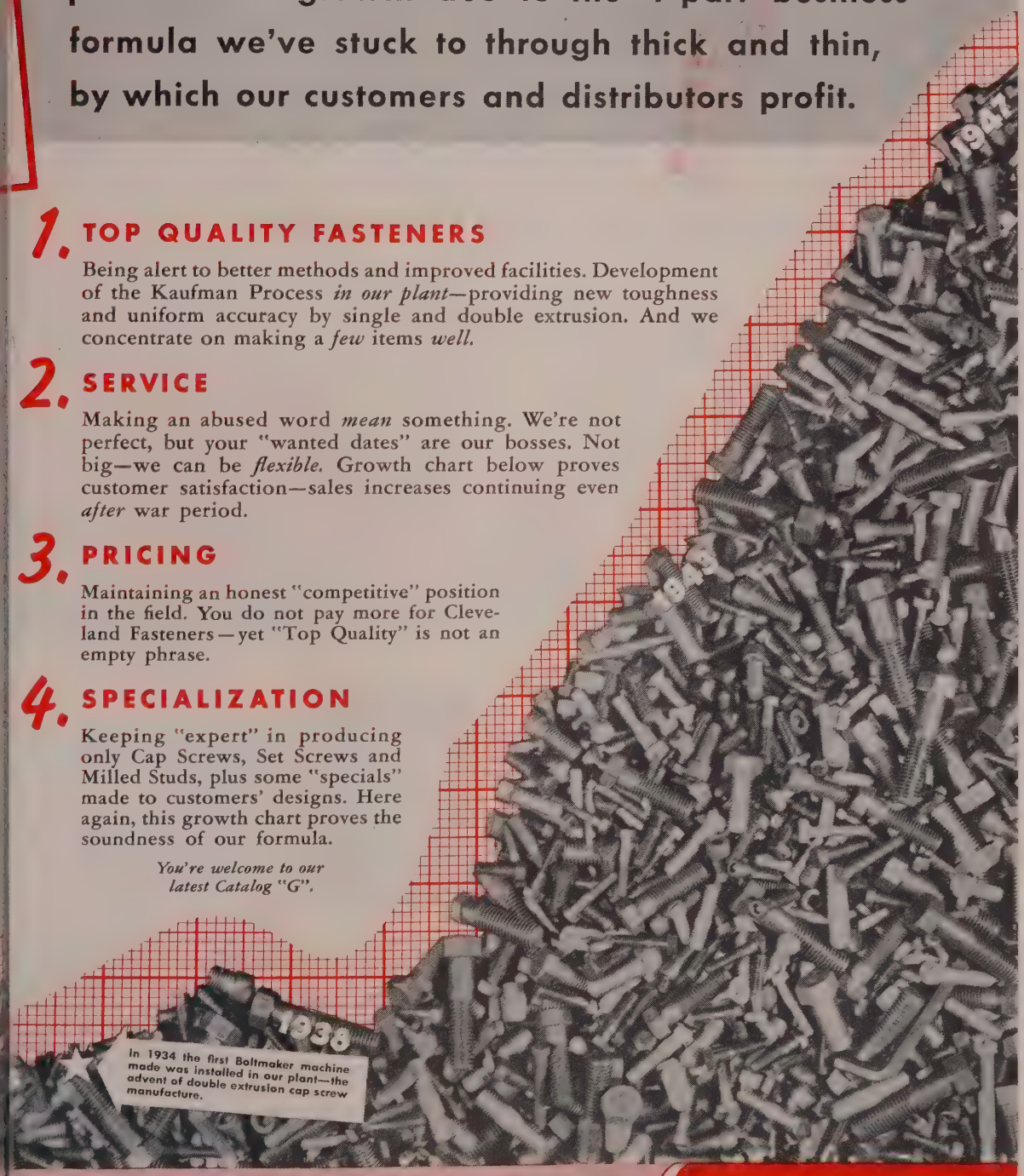
3. PRICING

Maintaining an honest "competitive" position in the field. You do not pay more for Cleveland Fasteners—yet "Top Quality" is not an empty phrase.

4. SPECIALIZATION

Keeping "expert" in producing only Cap Screws, Set Screws and Milled Studs, plus some "specials" made to customers' designs. Here again, this growth chart proves the soundness of our formula.

You're welcome to our latest Catalog "G".


1947
1938
In 1934 the first Boltmaker machine made was installed in our plant—the advent of double extrusion cap screw manufacture.

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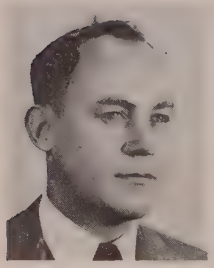
KAUFMAN DOUBLE EXTRUSION PROCESS

Metal Production

Electric steel capacity to be boosted 6 million tons annually . . . More efficient uses for lead studied . . . Sees greater demand on steel industry this year . . . 2000-ton blast furnace "around the corner" . . . Oxygen still in experimental stage . . . Better refractories predicted



Producers Turning to Scarfing Units in Battling Rising Costs

I. P. THOMPSON

Development engineer, Linde Air Products Co., New York: "Use of flame-scarfing machines for conditioning steel has continued to expand. As conditioning costs continue to rise, more and more steel mills are turning to oxyacetylene scarfing machines, located right in the production line, to hold down costs and maintain high quality. Direct rolling of steel processed by these machines is becoming an accepted practice in many mills, and other mills are cutting down on their secondary conditioning requirements by hot bed inspections and etch tests to select heats that do not have to be sent to the conditioning yards. As a result of these practices, considerable emphasis is being placed on building scarfing machines that will be as fool proof as possible and will do a high quality scarfing job. Controls are being made more automatic to eliminate as much as possible the human element in the operation of the machines. Nozzles are being improved to assure more uniform surface removal.

"During 1948, the first machine equipped with controls for automatically positioning the steel, initiating the scarfing cycle, and shutting the machine off, was installed. Also, a number of new machines were developed to increase the range of products that can be processed. Machines are now available to handle the full range of blooms, billets and slabs normally rolled in this country."

Nodulized Iron System Seen For Small Quantity Production

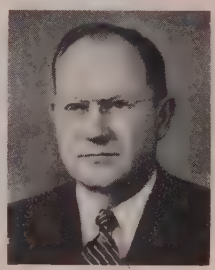
J. B. CARLOCK

Chief consulting engineer, Loftus Engineering Corp., Pittsburgh: "Subject of direct reduction of iron ores is still a live issue, not as a direct competition with the quantity production of blast furnaces, but as a source of iron in much smaller quantities where various limitations mitigate against the installation of blast furnaces. These limitations are character of the ores available, particularly those with a high silicon content and lack of metallurgical coal for the manufacture of coke, and a definitely small demand for iron and the steel products that can be made from it.

"This is particularly true in the case of a number of foreign countries which are having great trouble getting allotments of steel, even in quantities varying from 10,000 to 30,000 tons per year, principally in reinforcing bars, small structural shapes, sheets and wire. They have iron ore of varying grades, generally not too good, but no metallurgical coal. Although some have a small amount of coal that can be burned successfully as pulverized fuel, most of them have oil available and some natural gas.

"Their needs for iron can well be met by the cement kiln, nodulized iron system which is in successful operation at several places in Europe, where quantities from 20 to 50 tons per day are being produced.

"We have developed a method to take the nodulized iron direct from the kiln and melt it for casting into pigs or for charging as hot metal to small converters or open hearth furnaces."



Electric Steel Capacity Upped 6 Million Tons Annually

HARRY WALTHER

Superintendent, of melting, steel and tube division, Timken Roller Bearing Co., Canton, O.: "Electric arc furnace ingot capacity is in the process of being increased by about 15 per cent to a total of around 6 million tons annually. Current demand for carbon steels has provided the incentive to build new units of large sizes in which claims are made that operating costs are equal to or less than in the open hearths. Favorable factors in this trend have been the development of very high powered melting transformers, improved furnace design in which scrap preparation is less of a problem than formerly, use of the oxygen lance for decarburization, bath temperature recording instruments, spectrometers and a better knowledge of oxidizing slag control technique have all aided in much higher production rates with a fair degree of metal uniformity. These same factors are also highly important in controlling production of constructional alloy steels in which metallurgical and chemical demands are very rigid and incidence of error is likely to occur.

"It would be difficult to forecast just what effect a return to normal conditions would have on electric furnace production but it is certainly obvious that now is the time to improve upon existing facilities and meth-

5

NEW BLAST FURNACES COMPLETED BY McKEE IN 1948

DURING 1948 Arthur G. McKee & Company completed engineering and construction of five new blast furnaces with a combined annual capacity in excess of two million net tons.

These projects included stoves, cast houses, stock houses and gas cleaning equipment.

McKEE

ARTHUR G. McKEE & COMPANY
Engineers and Contractors • Established 1905
2300 Chester Avenue • Cleveland, Ohio
30 Rockefeller Plaza • New York, N. Y.

DESIGN, ENGINEERING AND CONSTRUCTION
FOR THE IRON AND STEEL AND PETROLEUM REFINING INDUSTRIES

UNDIVIDED RESPONSIBILITY IN ONE ORGANIZATION

ods wherever possible in order to meet competition with higher production at lower cost and with a more desirable product."

More Efficient Uses For Lead Studied

ROBERT L. ZEIGFELD

Secretary, Lead Industries Association, New York: "Tight lead supply situation and high prices have naturally given impetus to the search for substitutes for lead and have tended to concentrate work on lead itself toward more efficient methods of use rather than toward new products. However, because of lead's peculiar physical and chemical properties, with minor exceptions, the search for substitutes has not been very successful.

"Lead has long been used as lining for chemical equipment handling corrosive chemicals, notably sulphuric acid and for some years lead has been homogeneously bonded to steel for this purpose, particularly where heat transfer, high pressures, vacuum, vibration, drastic temperature changes, etc. are involved. Improved methods of applying the homogeneously bonded lead are reported which tend to cut the cost and therefore broaden the field of applicability of this product. The same may also be said of lead covered copper coils for heating coils for use with high pressures.

"Experimental work is also being done with lead-covered cable for heating electroplating solutions instead of the usual steam or hot water heating coils. To our knowledge this is still purely experimental and has not had commercial application.

"Lead and lead-lined valves have been used for many years in handling corrosives. The broader list of harder materials now available has made it possible to make the plugs or seats of these valves of a wide variety of abrasion resistant materials, thus reducing the wear on the plugs or seats.

"In smelting lead, one of the largest smelters in the world is experimenting with the use of oxygen in the blast furnace. To date favorable results are indicated but it is too early to know just how wide the applicability of the use of oxygen will be in lead smelting.

"Lead in powder form is now adapted to several new uses. For example, expensive dies in powder metallurgy processes, and for other purposes, are tested by taking impressions with lead powder."

Demands on Industry Seen Greater in 1949

ROBERT W. WOLCOTT

President, Lukens Steel Co., Coatesville, Pa.: "Unless the Soviet Union should completely and convincingly abandon ambitions of expansion which would reduce our government spending, combined military, foreign aid and civilian demands on American industry will be greater than those of 1948.

"This further expansion of our economy undoubtedly will bring about a set of conditions which will considerably widen the markets for steel plate and specialties made from steel plate. On the other hand, talk of legislation to control prices, mandatory allocations of steel products, increased labor and material costs instills a sense of cautiousness into any projection of profit for the coming year.

"Since indications are that 1949 employment generally will be as high or higher than that of 1948, taking into account Selective Service manpower requirements, which probably will be offset by increases in the working force through employment of women, flow of workers from school to industry and other factors, it is reasonable to suppose that the spendable income of consumers will be as high, if not higher than in 1948, thus lessening the probability of a sharp downturn of general business volume.

"Accordingly, we see no reason not to continue to carry out our long-range plan for capital additions and replacements. The company spent the equivalent of 80 per cent of its profits during the last year in capital expenditures.

"We plan to approach our 1949 marketing opportunities on the basis of building business in markets we can economically serve even when extraordinary boom conditions of the present do not prevail."

Value of Oxygen Now Becoming Better Appreciated

GEORGE V. SLOTTMAN

Technical assistant to vice president, Air Reduction Sales Co., New York: "Continued experience with the use of oxygen in metallurgical processes has resulted in a better appreciation of the economics of these applications. In open hearth practice decarburization with oxygen has become the standard method of making steels with carbon contents below 0.05 per cent. In the electric furnace, oxygen is extensively used to improve chromium recovery in melting low carbon stainless grades.

"Value of applying oxygen to higher carbon heats is still open to discussion and undoubtedly varies with the operating problems of each particular plant. Combustion uses of oxygen are largely confined to small foundry furnaces and, on an intermittent basis, to improve the synchronization of melt and mold shop. Large scale uses of combustion oxygen continue to depend on future progress in the production of 'tonnage oxygen'.

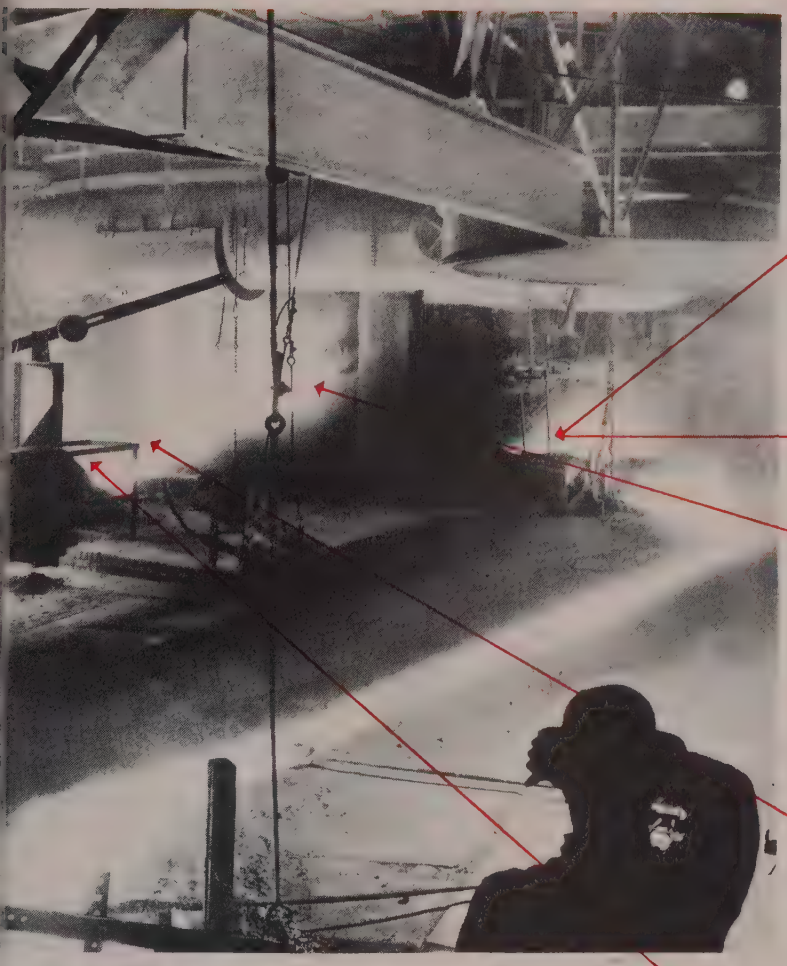
"Several plants have experimented with oxygen in the bessemer. Results obtained confirm the work done in Germany by Haag, Eilender and Roeser—and include faster blowing times corresponding to the increased oxygen supply, permitting higher scrap and ore charges and yielding steel with a lower nitrogen content. This promising application will also require oxygen in tonnage quantity.

"Some interesting work has been done with foundry cupolas. Small blast enrichments of 1 to 2 per cent are used at the start-up and blow-down to improve metal temperature and casting quality. This intermittent use of commercially pure oxygen in small quantities for control purposes appears to have economic possibilities.

"Considerable progress has been made in the field of 'tonnage oxygen'. Announcement was made in October of the start-up of the low purity oxygen plant at the Johnstown plant of the Bethlehem Steel Co. This oxygen is being used in an experimental program involving full-scale blast furnace tests with oxygen-enriched blast

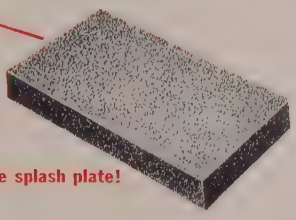
WHEREVER THE HOT STUFF HITS

USE CARBON



For the cinder notch liner!

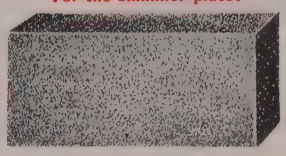
For the cinder notch plug!



For the splash plate!

For the runout troughs!

For the skimmer plate!



"National" carbon is now firmly tablished for blast furnace linings. is being used outside the furnace as ell—wherever there is contact with olten material—for the splash plate, inout troughs clear down to the ladle, kimmer plate, cinder notch liner, and nder notch plug.

The reasons?

"National" carbon has no melting oint. It is highly resistant to slag at- ack and thermal shock . . . not wet by olten metal . . . has a low thermal ex- ansion . . . and maintains its mechan- al strength at elevated temperatures.

Use "National" carbon inside and outside your blast furnaces and you cut down maintenance, speed up production and save money. For more information, write to National Carbon Company, Inc., Dept. S.

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The small German plant installed at the Bureau of Mines experimental station at Louisiana, Mo., has been operating since November. This plant is being used in studies of coal gasification.

"The year of 1949 should see the start-up of four additional 'tonnage' plants—of which two will be in the steel industry and two in the chemical industry. By the end of 1949, a clearer picture of the economics of large-scale low purity oxygen production and use will have been obtained, based on actual operating experience."

Predicts Increase in 1949 Slab Zinc Output

ERNEST V. GENT

Executive vice president, American Zinc Institute, New York: "While the record-breaking consumption of metals has become a commonplace subject, it is nonetheless noteworthy that so far the supply of zinc has been sufficient to match the pace of its increasing use. However, this is not to suggest that production has been sufficient to satisfy the demand, which seems always to be ahead of consumption as well as supply.

"To illustrate: In the 1938-1947 period, use of zinc in galvanizing increased from 256,000 to 360,000 tons and use of zinc in die castings increased from 48,000 to 215,000 tons. Even so, at the present rate of use, galvanizing in 1948 will again break all records and come close to hitting the 370,000-ton mark, while zinc in die castings is headed for a new record of 230,000 tons.

"Provided labor troubles and power shortages are avoided, 1949 should develop a modest increase in the output of slab zinc. Will the 1949 use of zinc again break all records, and what of the unknown requirements for the nation's stockpile? Under the existing conditions and with the ill repute of prophets in mind, it seems wise to defer predictions on these points."

New High-Speed Tool Bits And Drill Rod Developed

ARTHUR A. SCHWARTZ

Production consultant, Buffalo: "Looking back over more than 60 years of steel development one recalls the good old days when the word 'steel' meant high carbon or tool steel only. The remainder was iron or cast iron. And when we wanted something extra good we asked for Swedish iron. I remember the introduction of high speed steel tool bits and the habit of its salesmen to refer to its cratering tendencies as an added advantage of self sharpening.

"Many times during past years we thought that steel and its techniques had advanced to the ultimate and any further progress would be in minor details only. Now we feel otherwise. We have observed the ever-increasing pace of development and our imagination falters when we try to predict future developments, but we never doubt that major advances are imminent. Use of more and more oxygen in the production furnaces is rapidly advancing; it also helps in the reduction of some of the lower grades of ore. Fabrication techniques are advancing and metallurgy is not lagging.

"Metallic titanium is now available from a pilot plant and we may have another class of alloys from it as we did from molybdenum. The insistent demand for alloys to withstand higher temperatures of the gas turbine and jet engine may be aided by the high melting point of titanium. A new high speed tool bit and drill rod of fantastic hardness and toughness nonbrittle and noncratering has just been developed in a small Indiana plant and some of the larger manufacturers are now using it and are reporting phenomenal results."

Carbon Blocks Used for Higher Hearth Construction

G. O. O'HARA

Sales manager, Great Lakes Carbon Corp., Niagara Falls, N. Y.: "Recent trends in blast furnace hearth lining installations have been marked by three significant factors: (1) A preponderant use of carbon blocks in lieu of ceramic refractories for the lining itself, (2) increasing tendency toward use of larger carbon blocks, (3) use of carbon up to higher levels of the furnace.

"Almost all of the blast furnaces relined in 1948 were relined with carbon blocks. In many of these, larger blocks than in vogue heretofore were used for sidewalls, as these large blocks, cut in barrel-stave fashion, produced a strong assembly and provided for ease of installation. Use of carbon sidewalls, previously limited in height to the tuyere level, has now been extended upward, in one instance all the way to the mantle. Other carbon linings now on order call for sidewall height up to the bosh."

Demand for Stainless-Clad Sheets Develops Rapidly

L. W. TOWNSEND

Manager, Composite Steel Div., Jessop Steel Co., Washington, Pa.: "A prediction has been made several times in the past that production of composite materials would receive widespread attention, and wide application in the metalworking industry. Nonferrous and ferrous clad material in plate gages having a comparatively high alloy facing on one side has been the first of the composite materials to become available in substantial tonnages.

"Composite metals in the sheet gages were available in limited quantities, but have not by any means kept abreast the heavier material in supply. During 1949 light gage stainless clad material will become available in substantial tonnages. Demand for stainless clad sheet is rapidly developing because of the economy, metallurgical qualities, and availability. Stainless clad can be used in many applications formerly involving plated and nonmetallic coated material. Where stainless clad sheet is substituted for solid stainless, it is usually because clad sheet material was not available at the time the decision was originally made to use solid stainless in a particular application.

"Stainless clad plate is well established as material with which to design equipment requiring corrosion resistance, ease of cleaning, and noncontamination on one side only. The product is expected to develop into a very useful answer to various engineering problems in the sheet metal field.

"Composite material consisting of a tool steel section backed by a comparatively low alloy and inexpensive

eel has not as yet received the attention that it will timately receive. Composite steels generally will be- me progressively more important because of the econ- ny and physical properties they afford."

Year's Increased Steel Output Reveals Materials Problems

CHARLES M. PARKER

Secretary, committee on manufacturing problems, American Iron and Steel Institute, New York: "The year 1948, characterized by the highest steel production in any peacetime year highlighted any important raw materials problems. Quality of metlurgical coking coals deteriorated, quality of scrap was oor, iron content of many ores was slightly lower and lica slightly higher than heretofore, sulphur increased limestone and fuel oil, and the shortage of domestic pen hearth charge and feed ore became acute.

"To offset those obstacles to increased steel produc- on, it was necessary to increase coal washing and bene- ciation of iron ore and to increase use of sinter and mestone. Desulphurization and desiliconization of open earth hot metal were also increased.

"It is evident that industry research work done up now has checked any threat to increased steel pro- uction but it is also evident that many of the problems urrently solved may have to be reworked in connection ith the more fundamental problem of increasing our re reserves through economically releasing the iron con- nt of Lake Superior taconites.

"Moreover, problems involved in economically concen- rating the lean ores of such important elements as man- anese and chromium found in the United States are ven more pressing. Encouraging technical developments ave been reported in several such fields."

High Pressure Blast Furnace Helps Meet Demand for Iron

RALPH H. SWEETSER

Consultant in blast furnace practice, New York: "In order to meet the unprecedented demand for iron throughout the entire year of 1947 there were two diametrically opposite methods used. The rst and most productive technique was putting into ractice the wonderful results demonstrated by the late oseph Slater at the high top pressure blast furnace of he Republic Steel Corp. mentioned in my comments in his column last year. Several blast furnaces were con- erted to 'pressure blast furnaces' so that enormous olumes of air blast could be blown (upwards of 100,000 ubic feet per minute) into big furnaces without any of he bad effects of 'over blowing', but instead resulting n 20 per cent increased pig iron production per furnace nd 12 per cent decreased coke consumption per ton of ig iron. This is another paradox in an industry that is pt to have such things happen. It is now reported that lans are afoot to blow 125,000 cubic feet per minute t 40 pounds bottom pressure!

"At the opposite end of this paradoxical method of using vast volumes of air blast per ton of iron was the pilot plant of the U. S. Bureau of Mines at Laramie, Wyo. where iron ores were reduced without any air blast whatsoever. This had been done previously by independent investigators on a laboratory scale, patents were issued but no pilot plant erected. The only oxygen involved was in the solid oxide which united with carbon in the solid fuel leaving the iron free as 'sponge iron'. This was not pig iron but a sort of scrap and ore material for use in the open hearth furnace."

2000-Ton Blast Furnace Just Around the Corner

JOHN L. BRAY

Professor of metallurgy, Purdue University, LaFayette, Ind.: "With the crying demand for steel, approaching developments in blast furnace operation are most encouraging. For the past 50 years metallurgists have been confronted with certain physical limitations in blast furnace construction having to do with size, penetration of blast, production of flue dust, etc. By reason of wartime developments the writer is optimistic enough to predict that similar changes will be made in our raw materials.

"Many millions of dollars are currently being expended in research on the beneficiation of taconite, and, whereas this will solve the problem of our diminishing ores, it will also be the means of producing a much better raw material for use in the blast furnace, having a higher iron content and greater porosity. Likewise we must solve the problem of higher cost and diminishing reserves of high-grade coking coal.

"In this field encouraging research is going on, aimed at the reduction of sulphur in the lower grade coals. Another raw material currently being beneficiated is air. No longer content with a raw material containing 21 per cent oxygen (the chemical engineer has been dissatisfied with that for a long time), the metallurgist is already using it in the open hearth furnace. A plant is now on paper to produce 800 tons of oxygen per day, and it seems likely that within the next few years both blast furnaces and the bessemer converters will be blown with enriched air. True, all of the above problems await solution, but nevertheless the blast furnace producing 2000 tons of iron per day is just around the corner."

Refractories Industry Meets Increased Requirements

C. E. BALES

Vice president, Ironton Fire Brick Co., Ironton, O.: "The refractories industry continues to be on the alert, so as to serve in the most efficient manner, the increased requirements of the vast iron and steel industry. Several new plants of the most modern design have been constructed and many of the older plants expanded and modernized their facilities.

"Refractories technologists are keeping close watch on the new developments in iron and steel plants, such as the use of greater wind pressures in blast furnaces and

the use of oxygen in open hearths and electric furnaces. This will no doubt bring about an increase in the use of basic brick, super-duty silica and better brick for open hearth checkers. The manufacturing processes in refractories plants are under closer technical control and research on refractories is being sponsored by the industry in a number of universities. Considerable attention is being given to the latent possibilities of several pure refractory oxides for use in furnaces where unusually high temperatures prevail.

"Use of high grade refractory bonding mortars is on the increase in steel plants and ramming refractories are more widely used in the foundry industry."

Shortage of Other Metals Places Burden on Aluminum

HENRY C. BOYNTON

Consulting metallurgist, Research Institute, Temple University, Philadelphia: "Demand for wire products, ferrous and nonferrous, still exceeds the supply, except for one big item—steel wire rope. One reason perhaps is that the government recently released for sale much wire rope stocked during World War II. Another may be that some of the big users of wire rope stocked a heavy supply during the war, and are still holding it.

"Large demand for copper and brass wire has far outstripped the supply, and it will be a year or more before the mines and mills will catch up. This shortage has contributed to the big demand for aluminum and, according to late figures, this metal is now in a "tight position", with dwindling stock piles.

"Wire manufacturers also are contributing to a higher output by redesigning and speeding up their machines; they are also carefully inspecting and reshaping their carbide dies to get longer life with better lubricants fitted to withstand higher and higher die pressures and operating temperatures. English and American researches are being projected to aid in this undertaking, so that in the future the wire die maker will design his carbide dies much more carefully with "angles and reliefs" to *match heavy and light drafts* on both *hard* and *soft* steel, also nonferrous metals.

"The extrusion of heavy coils of yellow brass has emerged from the experimental stage and is now 'going strong'. All sizes from ¼ to 1 inch can be extruded in coils of 200 pounds or larger. Surface quality on such extruded rods and wire far exceeds the same product hot rolled. Moreover, twenty different alloys may be extruded some of which are impossible to hot roll.

"Pickling and inhibitors have received much recent attention. Bad actor 'nascent hydrogen', produced in pickling, has been found not to be the only malefactor; many sulphides particularly sulphuretted hydrogen have embrittling properties; arsenic also, if present in the pickle bath in small amounts is also "bad" but in larger quantities it actually inhibits brittleness produced by hydrogen.

"Speaking of inhibitors, it has recently come to light from the work of several research workers that these inhibitors have been highly overrated. One authority states that of 15 inhibitors studied in pickling of mild steel sulphuric acid the following results were found: Seven failed to prevent hydrogen embrittlement regardless of acid concentration; four reagents prevented embrittlement, but only at higher than usual concentrations; only four satisfactorily prevented embrittlement at concentrations less than the minimum common "proprietary range". In stainless steel, eleven of these caused greater brittleness than that produced by pickling in raw acid; only one caused less embrittlement than the raw acid.

"In coating steel to prevent corrosion a new method of 'hot dip' aluminizing wire has emerged from the experimental stage into actuality. An electric resistance furnace is used and the aluminum is floated upon a bath of flux. After perfect degreasing and pickling, rinsing and drying, the article is immersed in a molten flux for a few seconds, then immediately transferred to the furnace containing the molten aluminum.

"Coating thus produced is composed of two layers, the outer, pure aluminum, and the inner, next to the steel, an alloy of Al and $FeAl_3$. The coating is very adherent and may be of any practical thickness desired. Such a coating is highly corrosion resistant and, it is claimed, will resist temperatures up to 1750° F with only slight discoloration."

Scarfing Improvements Keep Pace with Steel Production

G. E. BELLEW

Steel mill specialist, technical sales division, Air Reduction Sales Co., New York: "Continued amazing rate of steel production through 1948 has required that such steel-conditioning processes as oxyacetylene deseaming and scarfing keep pace. A higher production rate with less effort in order to obtain improved quality, is constantly sought. Typical of the steps taken to this end is a new light-weight, manual scarfing torch for skinning all carbon steels, with integrated operating mechanism for starting-rod feed. This torch was designed specifically to reduce operator fatigue through light weight and ease of operation, and built to reduce field maintenance to a minimum. Other developments, in machine scarfing, scarfing of stainless steel and allied techniques, continue to keep the oxyacetylene process as one of the most useful steel mill tools."

Temperature Control System Affords Uniform Coke

W. A. LEECH JR.

Sales department, Koppers Co. Inc., Pittsburgh: "Demand for blast-furnace coke from the by-product coke oven plants presents a continuing problem.

"Many older batteries are now being modernized by the addition of self-sealing doors and new auxiliary machinery. In some cases new ovens must be built before the older ones may be shut down for modernization in order to maintain the coke-production rate. In other plants new ovens are being built and elsewhere new plants are contemplated.

"The trend to large ovens fired by the underjet method, equipped with self-sealing doors, modern labor-saving equipment and safeguards continues. A novel system for control of the temperature in the top of the oven has been perfected so that the newest ovens produce still more uniform blast-furnace coke for the iron masters.

"New developments in the design of saturators for the manufacture of ammonium sulphate from the ammonia in the coke-oven gas promise power savings be-

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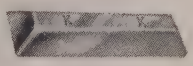
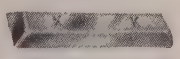


50-pound Keokuk Electro-Silvery Pigs for blocking the open hearth heat. For equal distribution of silicon and best temperature melt-down. Handled by magnet.

FOUNDRIES



50-pound Keokuk Electro-Silvery Pigs for charging mechanically or by hand into the cupola. Easily broken into two or more pieces, handled by magnet and measured by weight. Regular or alloy analysis.

FOUNDRIES

2½-pound Keokuk Electro-Silvery Piglets so uniform in weight that they may be charged into the cupola by count, eliminating weighing operations. Handled by magnet. Regular or alloy analysis.

★ *Or, in Pale-Face language, 30 years. (The Moon Man over at the Almanac says the average time from New Moon to New Moon is 27 days, 7 hours and 43.2 minutes.) The Chief merely says: Heap long time.*

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cause of operation at low differential-pressures. At high gas-velocities single units to handle 100,000,000 cubic feet of gas per day can now be built saving much of the ground space now occupied by the older, smaller type equipment"..

Organized Research Held Key to Industrial Progress

CLYDE WILLIAMS

Director, Battelle Memorial Institute, Columbus, O.: "Forward strides made in the metals industry during 1948 emphasize again that organized research is the key to the country's security and prosperity. Advances in titanium metallurgy, metals for high-temperature service, high-pressure operation of the blast furnace, continuous casting of steel billets, static casting of gray iron with high precision, the development of new automatic welding machines for joining light metals, the utilization of light metals, particularly magnesium alloys for long-range aircraft and ordnance, and in the processing of low-grade iron ore were the results of intensive, planned, and well co-ordinated research.

"Although there are many materials supply problems still facing us, a research-minded metals industry can look to the future with confidence. With the great asset of organized research on our side, none of the obstacles in sight is insurmountable."

Oxygen Used in Steelmaking Still at Experimental Stage

L. F. REINARTZ

Manager, Middletown division, Armco Steel Corp., Middletown, O.: "The steel industry is watching with great interest experiments being made by one prominent steel company in the use of high top pressure on blast furnaces in order to increase production. In most steel plants such experiments would mean a considerable expenditure of capital funds, because existing facilities are now being operated up to maximum capacities.

"A modern blast furnace has made some outstanding production records on low coke consumption with relatively low wind volume. Individuals who have checked these operations believe that ore and limestone sizing has had a lot to do with this success.

"Carbon-block hearth advocates received a setback when recently a newly-lined carbon block blast furnace had a serious break-out after only a short life. Now all operators are taking another look at this method of lining hearths before adopting this method of construction: (Editors note: This was a single wall lining.)

"Another steel company is starting to use oxygen to enrich air going into blast furnaces to find out what increased production and what economies can be effected.

"In the open hearth department use of oxygen continues. Operators now realize this practice is still in the experimental stage. It will take years of training workers and experimentation with equipment to develop this new medium for maximum tonnage production. At present oxygen is being used as an aid to combustion when needed, and also to help speed up reduction of carbon in the molten bath in those heats in which it can be used advantageously.

"Experiments in the use of all-basic or basic-end furnace construction continue. Time must elapse before it will be known definitely how successful this construction will be in decreased furnace repair costs or increased furnace production.

"Use of oxygen and the deterioration of the physical quality of scrap iron have presented serious charging problems to the open hearth melters, some of which are almost insurmountable in existing plants. However, considerable progress has been made in some plants in improving the preparation and packaging of plant scrap iron, and the improved sorting and cutting dealers' scrap iron into smaller pieces in order to increase the weight in each charging pan.

"Due to the urgent need for ingots, considerable electric furnace capacity is being used to melt and refine commodity steel grades—particularly in the low carbon ranges. The quality of such ingots has been good, yield from charge to ingots has been high, and progress is being made in decreasing operating costs".

Use of Continuous Cast Copper-Base Alloys Increasing

D. K. CRAMPTON

Director of research, Chase Brass & Copper Co. Inc., Waterbury, Conn.: "In the wrought copper alloy industry one of the interesting developments is the production of long rolls of strip by means of welding two or more normal strips. The shielded arc process is now coming to be almost universally applied to this problem and gives welds which are of excellent quality and which withstand the subsequent rolling and processing operations satisfactorily.

"Increased use of continuous cast copper-base alloys either to be used as such or for processing into rod or wire is noted. The phosphor bronzes either plain or leaded are especially well adapted to this procedure.

"Certain classes of use of wire products require unusually smooth, perfect surfaces of high luster, brilliance and color uniformity. These features are achieved by highly planished roll surfaces on rolls used for intermediate operations and by bright annealing and continual and careful maintenance of tool and die surfaces.

"In the field of seamless tubes, there is an increased use of high speed double drawbenches with forced lubrication permitting faster and more efficient production."

Personnel Training Programs Provide Capable Men

CHARLES R. FUNK

Chief metallurgist, American Locomotive Co., Latrobe, Pa.: "Increased emphasis being given to personnel training in the steel industry is excellent and those companies sponsoring such programs will be better staffed with competent men. Such educational programs will assure management of always having capable men available to take over the numerous and difficult tasks associated with positions of responsibility.

"Only in the past few years has the steel industry truly realized that so much depended upon the skill with which the foreman does his job. Not only must the

rogram include material and machinery training, but the raining of men to handle the human element. This tter is without doubt the most important and key actor in individual success, and is no longer (never hould have been) confined to salesmanship training.

"The foreman, must not only be a production expert, ut he must also know how to handle various personlities and all personnel training programs, therefore, hould emphasize this part of the training.

"It becomes increasingly essential that available manower willingly does more than ever before, gets the nost out of the machine, and wastes as little time and naterials as humanly possible. Proper personnel training is essential if this is to be achieved."

Aluminum Demand Far Greater Than Anticipated

JUNIUS D. EDWARDS

Assistant director of research, Aluminum Co. of America, New Kensington, Pa.: "Postwar demand for aluminum is much greater than was anticipated. Although the industry is now producng about four times the amount of primary metal in comparison with the average for the 1936-1939 period, t is still unable to satisfy the demand. In 1948, about ,200,000,000 pounds of aluminum will be produced for se in approximately 4000 or more applications and close o a million people are connected in some manner with he production of aluminum and manufacture of aluminum products. The aluminum industry has not been able o step up its production to meet this greatly increased demand because sufficient low-cost electric power is not available. At present, about 670,000 additional horsepower would be needed.

"Leading uses for aluminum are still in the architectural and transportation fields. Aluminum Co. of America will soon complete a new 40-million-dollar aluminum rolling mill at Davenport, Iowa. This mill represents many new applications of aluminum in its construction. Alcoa is also building a new reduction works at Point Comfort, Texas, where internal combustion engines, using natural gas for fuel, will be used to generate electricty."

Sees More Applications For Cold Finished Bars

MAURICE N. LANDIS

Manager, metallurgical and research divisions, LaSalle Steel Co., Chicago: "No changes of a sensational nature were noted in the cold finished bar industry during the past year. However, trends begun earlier are becoming more marked and are having an increasing effect on the industry. First, is the increasing use of parts made from cold finished bars produced to specified physical characteristics in place of parts heat treated after machining to develop the desired properties.

"Also, the scramble for steel has had a pronounced influence in concentrating the available tonnage in fewer industries. This continues the work begun by the standardization program instigated during the war and carried on by the later adoption of the "standard steels." It will undoubtedly persist as long as the present shortage of bars exists.

"Note should be made of the publication in 1948 of the new American Iron and Steel Institute Manual No. 9 on cold finished steel bars as it it an excellent up-to-date booklet on general cold finished bar practice."

Air-Emplaced Refractories Increase Open Hearth Life

HARVEY N. BARRETT, Jr.

Basic Refractories Inc., Cleveland: "Majority of shops making steel by the basic process in the open hearth and the electric arc furnace use air-emplaced refractories through the BRI gun to accomplish a multitude of hot repair jobs.

"In general, the refractory is used in the electric furnace to extend the life of basic brick sidewalls or to balance out the life of the various sections of sidewall lining. Benefits reported are an increase in lining life of as much as 50 per cent; a decrease in lining costs per ton of steel melted, which in one shop operating 30 and 50-ton furnaces amounted to a reduction of about 75 per cent with a comparable drop in the average shutdown time per ton of steel melted; and a major reduction in brick mason hours that in another large shop averages 1200 hours per month.

"In the open hearth so-called Gunmix is used principally below the slag line for major hot repairs to the hearth, and to 'pipe' or line tapholes. Gunchrome is restricted in most open hearth shops to applications above the slag line such as the maintenance of back walls, monkey walls, burner ports and housings, downtakes, endwalls, etc. One user reports a 100 per cent increase in downtake life through use of this material; others report a 2-week increase in backwall life."

Basic-End Open Hearths Decrease Operating Costs

R. P. HEUER

Vice president, General Refractories Co., Philadelphia: "Throughout 1948 there was continuous evidence of the program which leading manufacturers are following to insure the steel industry an adequate supply of suitable refractories. One completely new and modern research laboratory was built and put in operation. Several plants for the production of basic refractories, silica and fireclay were modernized. Use of special high-fired brick in blast furnaces increased and new facilities for the manufacture of these brick were made available.

"In open-hearth furnaces the adoption of completely basic ends as standard equipment with silica main roofs gained further impetus. At least six open-hearth shops have adopted rebuilding programs to equip all of their open-hearth furnaces with completely basic ends. This development has been brought about by the excellent results obtained from the 27 currently operating basic end furnaces. Each of these furnaces is showing lower operating costs than similar conventional silica end furnaces. Both refractories and labor costs have been lowered, the labor hours required for repairs and rebuilding being decreased from one-third to one-half. In addition, operating advantages such as less furnace down-time and easy slag removal have been attained in all cases.

"Two furnaces equipped with completely basic main

roofs as well as basic ends were operated during 1948. Experimental operation of these furnaces is continuing. Substantial increases in open-hearth production have been proved by the use of the all-basic furnace. However, the overall economics of the all-basic furnace are not entirely clear. Indications point toward considerable savings which can be achieved. Further improvements of fuel combustion which provide faster melting and increase fuel efficiency are needed to enhance the value of the all-basic furnace. Such problems are now being studied and more experimental work will be done."

Expects Little Change in Open-Hearth Practice

H. W. POTTER

Consultant (steel), Arthur G. McKee & Co., Cleveland: "During the coming year the continuance of certain trends in the open hearth is expected. Plants will battle for scrap, but an organized effort to improve the quality of the material by rejecting poorly prepared carloads, would quickly prove to be of mutual benefit. By requiring and adhering to a specification for denser bundles a considerable improvement could be gained in the melting characteristics of baled scrap.

"Fuel oil shows signs of greater availability and far better quality. There have been several instances of improvement in calorific value and reduction of sulphur, which can be carried still further at the insistence of the operators. Size of open-hearth heats can still be increased up to the limit of the equipment, with an improvement in tons per hour.

"If the country quietly absorbs another round of price increases without extensive or lengthy shutdowns, we should have a record year for ingot production."

Oxygen Complements High Top Pressure Furnace Operations

C. F. RAMSEYER

Assistant to president, H. A. Brassert & Co., New York: "Oxygen still holds the center of attention in the iron and steel field, and the early results from the three 'tonnage' oxygen units now under construction—one is already operating—in different American steel plants will be watched with great interest. Low cost tonnage oxygen generated in large central stations holds the promise that integrated plants can increase their pig iron and ingot output concurrently 20 to 25 per cent without the large capital expense needed for new blast furnace and steelmaking capacity. Use of cheap oxygen to turn low grade fuels, such as coke breeze, into a high Btu heating gas is another interesting possibility that will be explored.

"High top pressure blast furnace operation is also being watched with interest. From the technical point of view, oxygen and high top pressure seem to complement each other, oxygen favoring a direct, and H.T.P., indirect reduction, so that a judicious combination of the two should permit greatly increased output from existing furnaces with a minimum of disturbance to the normal temperature distribution in the stack. With oxygen and H.T.P. the 2000-ton-a-day furnace may yet turn out to need no more than a 25-foot hearth—especially if it is fed with a properly prepared charge.

"This brings in raw materials. Efforts are particularly being devoted to developing a better blast furnace charge material than the conventional sinter plant product. What the blast furnace needs is something which at the same time is both denser and more porous so that it will not only reduce more rapidly but the furnace can also hold more of it. This may sound impossible, but it can and will be done."

1848 Viewed as Year of Technical Progress

GILBERT SOLER

Works manager, Atlas Steels Ltd., Welland, Ont., Canada: "The world-wide demand for steel and steel products has strained the United States and Canadian steel mills during the past year. Construction and capital expenditures, as well as the demand for steel to be used for consumer goods, has created an unprecedented demand for steel. Steelmakers have met this problem by methods of improved efficiency to increase production. Typical is the use of high top pressures in the blast furnace and the use of oxygen in open hearth and electric furnace heats. Attention to greater production and lower costs has directed activities along the lines of studying methods of steel production to produce higher yields.

"Extensive studies have been made in hot topping practice in order to obtain 1 or 2 per cent extra yield over average past practice. Two processes for increasing yields have received attention: (1)—The Dornin process can be applied to alloy and plain carbon steels. (2)—The Kellogg process can be applied to tool steel, stainless and highly alloyed steels.

"It is noteworthy to mention that a practical method of continuous casting has been developed by Babcock & Wilcox Co., Beaver Falls, Pa. Yields of 96 per cent for molten metal to finished billet are obtained and savings can be made over methods used formerly for primary breakdown of ingots. Continuous casting may be limited to small shops operating electric furnaces.

"Interesting developments are proceeding along the lines of hot and cold rolling of steel. The Sendzimir mill for cold rolling of strip has been operated successfully by a number of concerns. All indications point to 1948 as a year of technical progress in the steel industry, in an effort to produce more steel at lower cost. Steel production has been restricted and limited to some extent by the supply of ore, scrap and pig iron. Considerable current interest has been shown in the Quebec-Labrador ore deposits in Canada.

"The scrap shortage, which was brought about by the export or loss of 150 to 170 million tons of steel and scrap immediately before the war and during the war, has affected the natural supply of scrap. In addition, there has been a reduced scrapping of automobiles, industrial equipment, household and farm durable goods. Steelmakers who have been pinched by scrap shortages have been forced to accept mixed grades of scrap which give lower melting yields and require increased time for ingot production.

"Importation of scrap from foreign countries is proceeding at a greater rate and should augment the domestic supply. In Canada the shortage of metallics for open hearth and electric furnace charges has focussed attention on the problem of scrap supply. Scrap supplies have been augmented by importing scrap from Hong Kong, Singapore, Australia, Japan, Cuba, South America, Germany, Belgium and other countries. Government encouragement is given to plans for producing more metallics to be used in steelmaking furnace charges."

Kelly's Creek Colliery Company

solves a costly maintenance problem with

J&L HEAT-TREATED JALLOY STEEL

J&L STEEL

Unretouched photographs of the sluices in the McNally-Pittsburg Coal Washer at the Maiden Mine, Maidsville, W. Va. (Above) Sluices filled with fast-moving coal and water. (Right) Water flows over the exposed JALLOY plates.

Sluice-plates formerly replaced monthly . . .
Now heat-treated JALLOY plates last 10 times as long

Slide 300 tons of coal *an hour*—day in and day out—down the steel sluices of a coal washer, and you would *expect* the bottom plates to wear out rapidly. Kelley's Creek Colliery Company* considered monthly replacements quite normal for sluice bottom-plates—until they put in J&L *heat-treated* JALLOY Steel. Now they get 10 times longer service. This means lower maintenance cost . . . higher profits.

But that's not all! Conveyor sides and bottoms of mild steel generally lasted 3 months at the most. A year ago JALLOY plates were installed . . . Present indications are that these plates will be in service at least *another year* before replacement is necessary. That will mean a minimum of *8 times* longer service.

JALLOY is a heat-treated, manganese-molybdenum steel developed by J&L for just such uses as these —for resisting extreme abrasion and heavy shock.

Manufacturers and maintenance men, alike, find that JALLOY heat-treated plate makes equipment last longer. The outstanding wear-resistant properties of this *modern* steel have been proved again and again in such applications as: Bulldozers . . . Scrapers . . . Rock crushers . . . Power-shovel buckets . . . Dump cars . . . Truck bodies . . . and Sand-blast equipment.

If abrasion is a limiting factor in the life of *your* equipment or products, you'll find it profitable to investigate JALLOY. Let us send you the booklet mentioned in the coupon.

Jones & Laughlin Steel Corporation
404 Jones & Laughlin Building
Pittsburgh 30, Pa.

☐ Please send me your booklet: "JALLOY—J&L Alloy Steel."

☐ Do you recommend Jalloy for:

.....

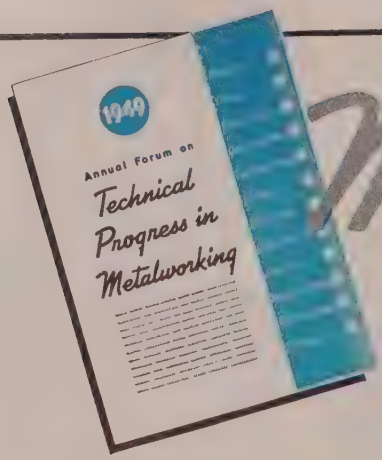
Name.....
Company.....
Address.....
.....

*Subsidiary of The Valley Camp Coal Co., Cleveland, O., producers of "Valley Camp" coal.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURALS AND PLATES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS



Machining

Inspection stations seen on machine tool of tomorrow . . . New broaches eliminate operator effort . . . Tool room tolerances now production line "must" . . . Buyers select machines to meet own needs—not other fellows' . . . "Finger-nail test" era now extinct

Inspection Stations Seen On Machine Tool of Tomorrow

RALPH E. CROSS

The Cross Co., Detroit: "Necessity of lowering unit costs and paying higher wages has made the machine tool an important factor in the operations of many industries.

"We are directing our attention to the reduction of indirect labor charges insofar as they are related to the machine tool in the mass production plant. Transfer and multiple station machines have reduced direct labor to a point where indirect labor seems large by comparison. For example, cost of changing and grinding tools and cost of inspection, in some cases, exceeds the cost of machining.

"In our opinion, the machine tool of tomorrow will have automatic inspection stations or attachments which will insure the desired degree of precision. Cutting tool design will be simplified to reduce the skill and time required for sharpening. Instead of having one complicated machine doing a complicated operation, several simplified machines will be used with automatic handling facilities to carry the product from operation to operation. Likewise, multiple station machines will be used to break operations down to their elementary form. Easier means of changing and setting tools will also be found along with arrangements for signaling the operator when tools are dull and need changing."

Automatic Loading Devices Eliminate Idle Time

OSCAR L. BARD

President, Michigan Tool Co., Detroit: "A year ago it seemed hardly possible, with the extremely fast high-precision gear cutting and gear finishing machinery available, that output rates of such items as spur and helical gears were susceptible of further increases. Yet during the past year the way has been shown toward a remarkable increase in productivity per machine and man hour.

"Automatic loading devices for gear finishing machines have practically eliminated idle time for such machines during a normal shift. Loading devices are of such a character that frequently it is not even necessary for the cutter to stop while a finished gear is being ejected and replaced by another. Since cutters on such machines are good for many thousands of gears without requiring sharpening, production rates have been practically doubled on the basis of total output during eight hours.

"An increase in rigidity of the newer gear cutting machines designed to cut all teeth of a gear simultaneously—has also made it possible in the case of narrower gears to effectively cut several gears at one time. In these machines too, productivity had reached such a high rate that down time—for cutter changes in this case—had assumed abnormal proportions when considered on a percentage of total operating time basis. However, research in cutter design has been effective in greatly reducing the number of tool changes required, while time for each tool change has also been reduced by new developments. In some cases, output of gears obtained before cutter sharpening is required is almost startling.

"Indications are that this development, so highly successful already in the spur gear field may be extended soon to the cutting of many types of helical gears."

Small Shops Need Flexibility Of General Purpose Machines

TELL BERNA

General manager, National Machine Tool Builders Assn., Cleveland: "Consider for a moment the extraordinary range of types and sizes of machines, of attachments and tooling, that have been developed by the machine tool industry. I have had repeated comments from overseas users that America leads, of course, in mass production. America also leads, as a matter of fact, in small lot production. It is precisely the small shop with small runs that needs the range, power, flexibility and accuracy of the general purpose machines that are produced in this country.

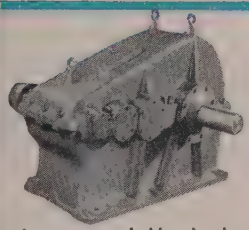
"Methods of mass production are spectacular, they get attention, they are well known. But most shops are small shops, and the greatest field for that increase in output per man hour that is the basic essential for recovery is the improvement of manufacturing methods in the small shop.

"It is high time that every nation—including our own,

D.O.James

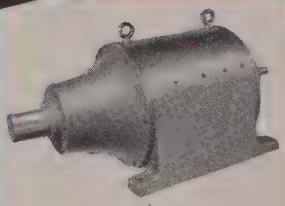
ESTABLISHED 1888

GEARED DRIVES MEET GROWING DEMANDS FOR POWER-SAVING EQUIPMENT IN INDUSTRY

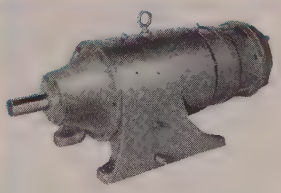


ontinuous-tooth Herringbone
Single, Double, Triple Reduction

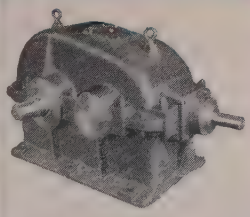
Type "H" Worm Gear



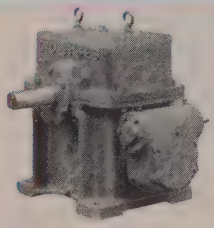
Straight Line Gear Reducer



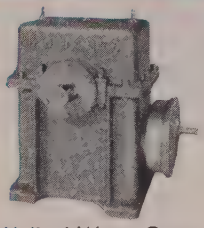
Motorized Reducers



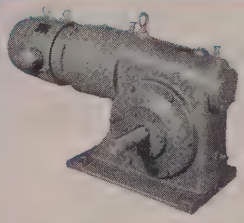
Spiral Bevel Herringbone



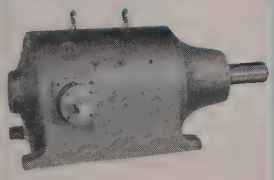
Double Worm Gear



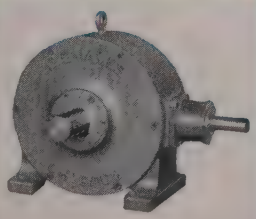
Helical Worm Gear



Motorized Worm Gear



Right Angle Gear Reducer



Spiral Bevel Gear

D.O.James Gear Manufacturing Co. is constantly developing and continuing to improve its variety of gear speed reducers—enabling engineers and designers of power-saving equipment to meet and cope with space limitations, horsepower requirements, ratios, location of driven or driving shafts and the type of drive that the many and varied installations require. Catalogs are available containing complete informative engineering data that will assist in the selection of the type of reducer for the specific job to be done.

D.O.JAMES GEAR MANUFACTURING CO.

Since 1888—Makers of Cut Gears, Gear Reducers and Flexible Couplings

1140 W. MONROE STREET • CHICAGO, U. S. A.

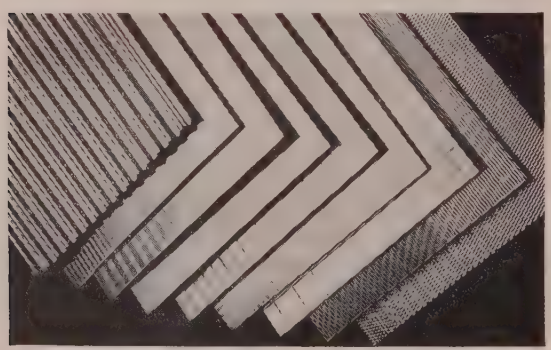
Plated Parts Move From Raw Material To Assembly Line In Two Operations

Manufacturing has been simplified in hundreds of plants through elimination of former methods which required cleaning of stamped parts, plating, polishing or other finishing, before going into final assembly. By substituting pre-plated Nickeloid Metals a streamlined, economical result has been achieved. In many plants Nickeloid Metals are (1). Blanked. (2). Stamped or formed. Then assembled. Handling, factory space, and equipment investment has been reduced or eliminated. Nickeloid Metals are available with finishes of Chromium, Nickel, Copper, Brass, Tints, or Gold Bond . . . plated to such base metals as Zinc, Steel, Copper, Brass, or Aluminum. Attractive patterns and finishes, saving other steps, also available.

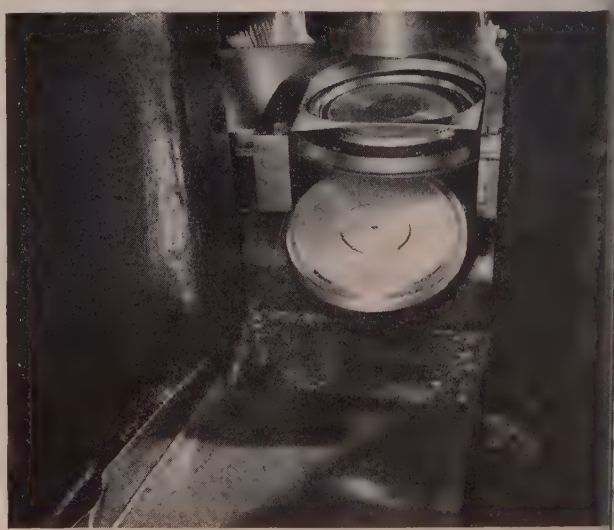
Representative Nickeloid Metals have been put up in an attractive and useful SAMPLER. Send for a copy on your company stationery.

BLANKING First step. With proper dies and good shop practice, the highly plated finish of Nickeloid Metals is not impaired. For unusually severe operations, Mar-Not protective finish is available.

STAMPING Beautiful results are achieved. Nickeloid Metals may also be riveted, soldered, spot welded, seamed, etched. Illustration below shows stamped part after ejection from stamping machine.



The wide variety of finishes and attractive patterns of Nickeloid Metals makes them a source of inspiration to the product designer. The company supplies samples to aid designers in employing these metals.



AMERICAN NICKELOID COMPANY
PERU 1, ILLINOIS

omes to realize the fallacy of retaining a piece of productive equipment merely because it is still in good unning order, or because it has not been "written off" n the books. The time to replace a machine tool, no matter what kind, is when the purchase of a better one justified in terms of earnings.

"The booklet just issued by our association 'The World's Best Investment' outlines the method of establishing in specific terms what those earnings are. The eal problem for every shop, large or small, is to determine which machine should first be replaced and hat purchase will bring the greatest return. The machine tool industry not only offers a tremendous assortment of machines but offers the method by which the arning to be gained by replacement is clearly established so that management can invest the funds with ssurance."

New Broaches Eliminate Time-Consuming Operator Effort

HARRY H. GOTBERG

Chief engineer, Colonial Broach Co., Detroit: "A year ago, the writer predicted in the annual issue of STEEL that broaching, due to its cost-cutting and production-boosting abilities would enjoy important gains during 1948. That prediction has come true nd promises to carry through with increased empha- s in 1949.

"Not only do both internal and surface broaching still ffer vast opportunities for the reduction of machining osts for all kinds of products, but broaching equipment as been further improved during the past year. Thus here has been added to the opportunity of replacing ower cutting methods by faster broaching, the opportunity of replacing older, less efficient broaching equipment by modern machines, fixtures and methods.

"Among the important advances in broaching equipment during 1948 is the considerable attention paid o eliminating time-consuming effort on the part of the perator. Automatic and semi-automatic broach handling echanisms are now beginning to be widely used for ternal broaching. For surface broaching no broach andling is required of course. Similarly, time and labor-saving loading devices, including quick-loading and uick-clamping fixtures, are the order of the day. In ome cases this has even been extended to the provion of conveyors to carry away the finish-broached arts as they are automatically ejected from the machines.

"Important, also, is the considerable attention given o increasing the safety features on broaching machines. It has been recognized that even an unjustified uspicion of the safety of any machine has a tendency o slow up the output of that machine. With most types f machine tools, the effect on output percentage-wise, ould be small. With broaching—and the enormous output capacity of broaching machines—any decrease in fficiency, no matter how small, has an important effect on the total number of pieces which reach the assembly line or the loading dock in any shift.

"One of the most interesting features along this line the provision of selective pre-set controls on dualype surface broaching machines. With these controls he machine automatically stops at the end of a cutting cycle unless the operator has finished re-loading the second ram. If he finishes re-loading before the end of the stroke, he pushes the start button and the machine automatically continues into its next cutting cycle, thus eliminating all idle time while giving the operator perfect security."

Improved Method Found For Machining Steel Wheels

GEORGE HABICHT JR.

President, Marshall & Huschart Machinery Co., Chicago: "Use of Diesel electric locomotives on high speed passenger and freight trains, has developed a problem for the railroads in keeping an adequate supply of finished wheels on hand.

"Previous machining methods also were outdated and had to be revised on account of the design of traction motor trucks, consequently, one of the most interesting developments has been the use of the 54-inch Bullard Man-Au-Trol vertical turret lathe, properly equipped and arranged to machine 33, 36 and 40-inch steel wheels. This machine is being used very successfully now in a number of railroad shops.

"As an example of what has been accomplished, the previous method of machining a 40-inch diesel locomotive wheel was to use a 54-inch Bullard regular vertical turret lathe with eight operations on one side of the wheel in the first chucking and six operations on the other side in the second chucking. Best time obtainable was 4 hours floor-to-floor time. This, you must understand was fine production time on a high grade new machine.

"The new method is to use a 54-inch Bullard Man-Au-Trol vertical turret lathe which can be operated either manually or automatically. Fourteen operations all done from one side in one chucking produces a wheel in 64 minutes floor to floor time. All tools used for these operations are carbide tools, whereas, with the old method only nine of the fourteen operations were done with carbide tools.

"The new method gives a much higher quality of finish and concentricity and balance are much better."

Mechanical Holding Preserves Strength of Carbide Tool

PHILIP M. McKENNA

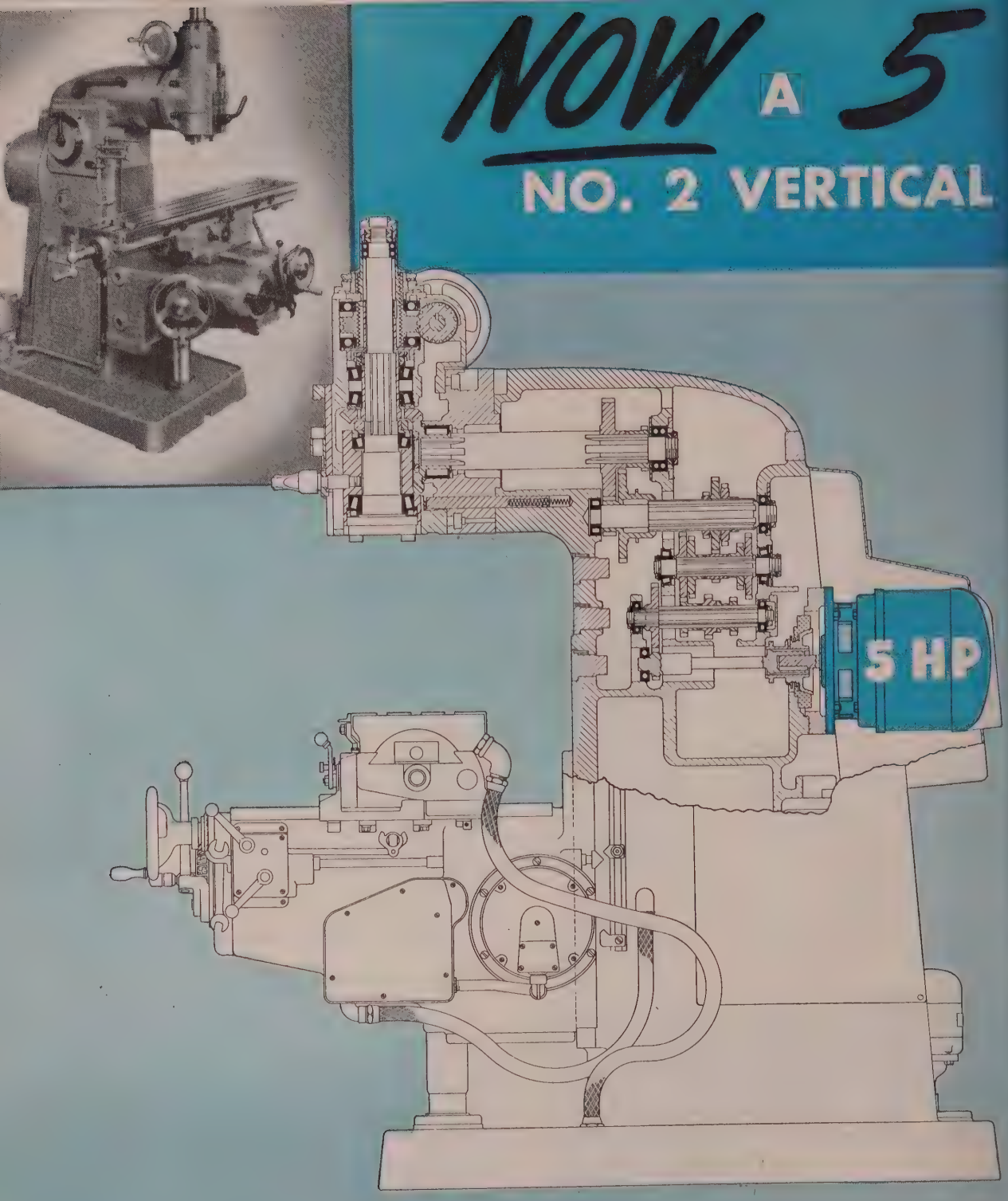
President, Kennametal Inc., Latrobe, Pa.: "One of the most significant advances made in carbide tooling for metal-working plants during the past year is the more widespread use of tools in which the carbide element is mechanically held.

"Our standard line of tools, having the carbide insert vertically positioned, has been expanded to include square and triangular inserts as well as round.

"This technique has thus been extended to a greater diversity of applications, permitting more widespread realization of its operating and maintenance advantages. Tool set up and adjustment are easier; dull inserts can quickly be adjusted to new cutting positions; grinding is less frequently required, and the process is greatly

NOW A 5

NO. 2 VERTICAL

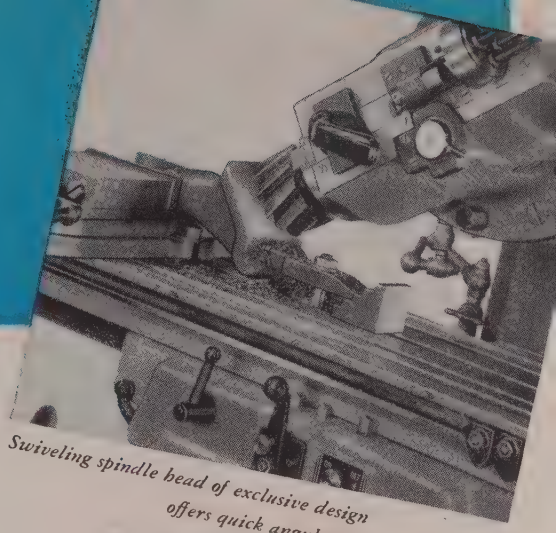


CAPACITY — Longitudinal feed 28″ — transverse feed, 12″ — vertical feed of knee 14¾″ — all power. Axial feed of spindle 3″, hand. Distance, center of spindle to face of column, 14″. 18 spindle speeds, 40 to 1530 r.p.m. 18 feed rates, ½″ to 20¼″ per minute. 75″ per minute power fast travel.

BROWN &

HORSEPOWER MILLING MACHINE

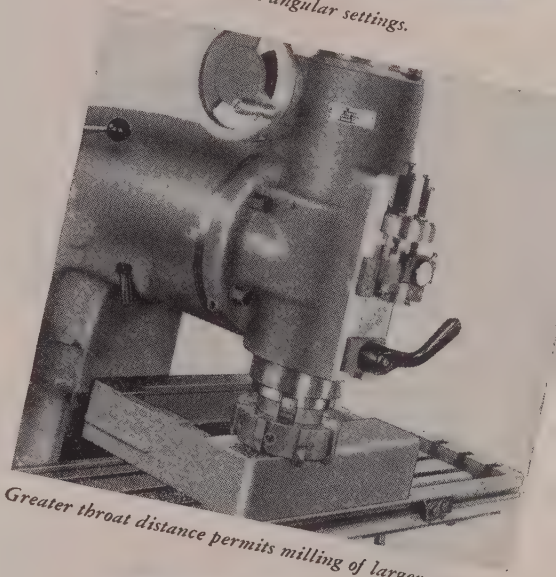
FOR HEAVIER CUTS



Swiveling spindle head of exclusive design offers quick angular settings.

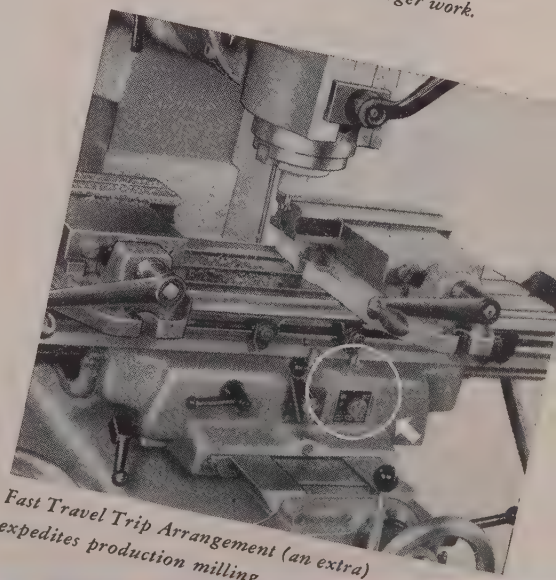
BROAD UTILITY. This new addition to the Brown & Sharpe line embodies all the production-boosting features of the popular No. 2 Vertical Light Type Machine. In addition, it has greater throat distance, a No. 50 Milling Machine Standard taper hole in spindle, suitable spindle speeds for larger cutters and ample power plus rigidity for work requiring heavier cuts. Full 5 horsepower is available for spindle drive — with individual motors for table drive and coolant pump.

Engineered for smooth, efficient, powerful cutter driving . . . rigid column casting with integral cross bracing; short, large-diameter shafts supported directly in column; anti-friction bearings supporting all shafts in speed train; independent all-gear drives. Features like these assure highly-accurate production and long, trouble-free performance. Write for details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



Greater throat distance permits milling of larger work.

USEFUL ATTACHMENTS. As with other Brown & Sharpe Machines, additional equipment is available for the new 5 H.P. No. 2 Machine — saving time and money on many operations. This consists of Rotary Attachments — Turret Type Spindle Stop — Index Centers — Fast Travel Trip Arrangement — Micrometer Table Setting Attachment — Scales and Verniers — Short Lead and Feed Reducing Attachment.



Fast Travel Trip Arrangement (an extra) expedites production milling.

SHARPE

B·S

simplified; a harder, more wear-resistant insert can often be used, as the mechanical holding feature preserves the full strength of the carbide. Numerous cases demonstrate that production is speeded up, down time of machines is minimized, and over-all costs are reduced.

"Special tools having larger-than-standard inserts (round or square) have also been developed for heavy duty operations.

"The line of conventional clamped-on tools, having flat advanceable tips, has been extended to include heavy duty types for planing cast iron jobs involving deep cuts, coarse feeds, and interrupted cuts common to planer work. The tip is a new, very strong grade of Kennametal, evolved to provide higher resistance to impact and cratering than heretofore possible on modern types of cast iron at customary planer speeds, which are usually lower than those available on lathes and boring mills. To insure the strongest possible tool point, the tip is clamped in a position to provide greater side rake, back rake, side cutting edge angle, and nose radius, than those on conventional turning tools, and it is backed up by hardened steel shims, bottom and side.

"To bring the advantages of mechanical holding to smaller tools (shanks ½, ⅝, ¾, and 1-inch square) a line of tools has been developed. Flat tips—round, square, triangular, or pentagonal—are fastened to the shanks with a countersunk flat head screw and socket nut. The tips are indexable, and can readily be turned to provide a succession of clean cutting edges. Necessity for regrinding is eliminated, as tips can be discarded when all of the available cutting edge becomes dull.

"To facilitate rough turning of chilled cast iron mill rolls on the conventional hand feed roll lathe, a line of tools having indexable and replaceable solid Kennametal cylinders has been evolved. They plunge cut readily through hard scale, leaving a scalloped surface, which is trued up to finished size with a broad nose tool having clamped-in Kennametal blade."

Tool-Room Tolerances Now Production Line "Must"

J. D. JOHNSON

Vice president and general manager, Bryant Chucking Grinder Co., Springfield, Vt.: "The economic history of this country indicates that increased productivity has been the major factor in overcoming high living costs. Today, regardless of whether the blame lies with high wages or high prices, the solution can still be found in refining our production system with an uptrend in productivity.

"Productivity depends on interchangeability of parts; parts made to high accuracy at low cost. Old machines which are worn or lack rigidity in design are incapable of meeting the standards of precision demanded by today's economy.

"New machines are needed more today than they have ever been needed in the past. The goal of the machine tool builders today is—or should be—to provide the means of producing high accuracy at low cost. Tolerances which were confined to the tool room in the past must be met on the production line today.

"Internal grinders equipped with automatic loading and sizing devices can produce precision holes which meet today's requirement of accuracy of size, shape, and finish. Other automatic internal grinders lend themselves to fast set-up for short runs; but in either case, the finished part turned out in a matter of seconds is superior to the best tool room jobs of not too many years ago.

"These machines are available now and it is with machines such as these that American industry will prove the worth and workability of the American free enterprise system."

Trend to Machine Tool Optical Systems Noted in Britain

FREDERICK S. BLACKALL JR.

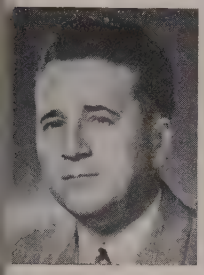
President and treasurer, the Taft-Peirce Mfg. Co., Woonsocket, R. I.: "American machine tool and equipment manufacturers who visited the Olympia Show at London during August and September, 1948 must inevitably have been impressed with the fact that Europe's and particularly Britain's machine tool and measuring instrument industries loom as formidable competitors in post-war world markets. No longer can American machine tool builders count on that important 20 per cent of their gross product which used to go into export. The British in particular not only are determined to manufacture within the British Isles every type of machine tool and gage for which there is any reasonable demand within the Empire, but, what is more, are pursuing a deliberate policy of excluding from their borders any machine or unit of which a comparable model is offered by a British manufacturer. The Ministry of Supply makes no attempt to conceal its determination to encourage the widespread copying or duplication of American machine tools, and the results were very evident at Olympia. Copies of American models and features were exhibited on every hand. Some examples were so flagrant as to permit actual interchangeability of parts with the American prototype. The Ministry's policy of exclusion sometimes is carried to the point of absurdity. As soon as a British manufacturer announces his intention of producing a 'comparable' machine, and without particular regard to delivery dates, productivity, available precision, or other considerations, unless these are of a most compelling nature, import licenses will be denied to the American prototype.

"The intent of all this, of course, is to conserve Britain's meager supply of dollar exchange for the purchase of foodstuffs and other imports. Every student of economics will recognize the importance of helping Britain to build up her dollar balances. Nevertheless, the American taxpayer is bound to wonder how much longer he will be willing to bear a staggering tax burden in order to support dollar grants to Britain, when they refuse to admit many of the taxpayer's own products.

"Amazing expansion of the British machine tool industry during the past decade suggests that the tools may be offered freely before long in the American market. While it is unlikely that Chinese copies of our own products will make much headway there, it must be recognized that some of the better manufacturers across the water have made genuine contributions to machine tool progress; among their products are machines which would be a credit to any nation. Some of these may constitute a competitive threat with which the American machine tool builder will have to deal in the years ahead.

"The Olympia Show was impressive when judged by any standards. Particularly noteworthy was the trend,

hich has become increasingly evident overseas, towards ie widespread application of optical systems to ma- ine tools and fine measuring instruments. England is lly a decade ahead of the United States in this im- ortant field. It is a trend to be watched, one which is ound to influence future machine design."



Trend to "Automaticity" Noted in Production Machines

WALTER S. PRAEG

President, National Broach & Machine Co., Detroit: "The metal working industry realizes the ever increasing demand for progressively higher quality in its products and also for greater econo- ies of production. Thus, we see a marked trend toward achines and tooling that are completely automatic— achines that require no thinking or experience on the art of the operator and a minimum of physical effort.

"Machines of this kind produce work within dimen- onal tolerances, minimize scrap losses and can be op- ated successfully by any man or woman regardless their training or skill. The day of the skilled ma- inist as a production machine operator is fast drawing a close.

"Regardless of the potential capacity of a machine, e average operator refuses to make use of it in in- easing production if it requires any material increase the physical effort demanded of him. In designing e machines and tooling of tomorrow, that fact will given due recognition. There is also a marked trend way from the standard all-purpose machine and toward e specialized machine designed for a specific appli- tion and minimum production unit costs.

"Another trend is the improved appearance of pro- uction equipment which has a desirable psychological fect on the operator and his regard for the machine is using.

"Observatons at the recent British machine tool show veal the extent to which British builders have followed ir lead in design. The fact remains, however, that they e producing these new machines which are comparable ours at a cost materially less than our costs. Conse- uently, they have an advantage in the export market.

"Thus, we are challenged to keep far enough ahead in chnical improvements to outweigh the price differ- ntial."

"Finger Nail Test" Era Is Now Extinct

KIRKE W. CONNER

President, Micromatic Hone Corp., Detroit: "One of the outstanding problems facing research, design and processing engineers today is determining, specifying and obtaining the correct surface finish n bearing surfaces. As the horsepower, speed and pres- ure is increased in all types of engines, finish on the rfaces that carry the loads becomes more critical.

"We have passed the era of the finger nail test and e visual inspection of surfaces, and are finding that, r many applications, a specified roughness in micro- inches does not guarantee that the surface has the required functional characteristics.

"Abiilty of a surface to carry a load without flaking, scuffing and breaking down, its ability to support an oil film, dissipate heat, mate and seal with another surface, are the functional characteristics that must be designed into a bearing surface. After determining which of these characteristics are the most important in a particular application, they must be specified and held.

"In the past, research on the characteristics of bearing surfaces has been complicated by the lack of measuring and comparing devices. Designing engineers have lacked a method of specifying the characteristics of the surface required. Process engineers have not had machine tools that would generate a perfect bearing surface and duplicate it. All of these tools are now available and as more and more use is made of them, better products with superior performance will result."

Serviceability—Keynote in New Machine Design

C. D. DAY

Sales manager, Grinding Machine Division, Norton Co., Worcester, Mass.: "There is no question that production men now expect increased practical values in their machine tools, as well as those things that will give them more production for a given work period. This practical view is brought about by the fact that 'down time' is expensive and consequently, must be reduced to the absolute minimum. All of this is over and above the precision and performance expected of the machine tool of today which is more complicated than earlier models, due to more and more automatic functions being built into the machine. This is a stiff challenge to the machine tool designer and in our new line of grinding and lapping machines, we have included features to enhance the so-called practical values of the machine tool. To mention a few of these features, we call attention to the following.

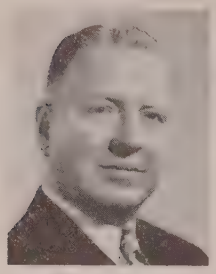
"Our hydraulic and coolant pump mountings have been made on the outside base wall. The mounting is compact and out of the way, but yet it is highly accessible for maintenance or servicing functions.

"A further promotion of ease in the servicing function is achieved by the new form of rear base design. A close approach is offered to the grinding wheel and combined with the new hinged type wheel guard, which does away with wheel guard cover lifting, wheel changing is considerably easier and is accomplished much faster. Furthermore, a ramped outlet cast into the low rear base wall makes the work of sludge removal much simpler, less time-consuming.

"The importance of standardization of electrical controls is evidenced by the fact that the Joint Industry Conference has recently issued revised electrical standards for industrial equipment. One of the chief reasons for such standards is to reduce 'down time' and simplify servicing or maintenance work for the electrician. Our new line of cylindrical grinders includes an elevated control cabinet at the rear of the machine, as a standard equipment item. Mounting of this panel assembly makes it possible to service from a standing position.

"Our steel ribbon type base way guards eliminate the necessity of having to sacrifice valuable floor space

in order to provide adequate protection for the base ways. These steel ribbon guards do not roll and unroll but remain in position and show a marked effectiveness at reducing infiltration of grit and dirt into the base ways."



New Machine Tool Features Will Help Earn New Business

JEROME A. RATERMAN

President, Monarch Machine Tool Co., Sidney, O.: "Machine tool builders cannot rely on an expanding economy and replacement demand for prosperity. It is not this easy. To 'earn' good business we must obsolete existing machines and methods and develop new ones to save time and improve quality.

"A few decades ago saw the advent of multiple tooling on turning jobs. Within the limits of high speed steels, these machines saved considerable time. They did, however, have the disadvantage of long set-up times and high work pressures, which frequently caused work run-out and work center distortion, making subsequent operations necessary.

"Growing acceptance of template-controlled or air tracer equipped machines using a single point tool has been due largely to their success in overcoming the above objections and permitting the use of tungsten carbides to their fullest extent.

"Because the tool can be replaced in less than one minute it has become possible to attain speeds as much as six times speeds possible with multiple tooling.

"In addition to accuracy of diameters and length of shoulders by template control, their combination with tapers, bevels and other forms with the only extra cost being in making the template, makes the set-up cost very reasonable. Set-up saving is highly important on short runs, and in many cases the actual machining time alone is reduced 50 per cent and more.

"Self centering drivers, automatic loading devices and power-operated tailstocks and chucks are other new features which should, of course, be given due recognition for the time they also can and are saving."

Basic Fundamentals Remain— New Applications Evolved

CLARENCE SNYDER

Chairman of the board, Snyder Tool & Engineering Co., Detroit: "I have watched fifty years of machining changes and one of my greatest pastimes today is to look back on the things that are done with the special machines that we never thought possible outside of the tool room, with the use of tool room methods. These changes have had to be made for probably three reasons: Machining which is done today must be finer and closer due to the speed with which we are expecting our mechanisms to operate; efficiency with which we expect our machine parts to operate, and then, of course, the greater labor costs.

"As I look at the machining which is used today in our business and then note the types of mechanisms used, I again see many changes from when I started in the business. The same basic fundamentals are used but different applications have been followed. These changes have taken place by the use of off-set heads, line type machines, trunnion type machines, and the further use of available cutting tools.

"The increase in labor cost has been due partially to the general increase given workers in our industrial plants. This, however, has not been wholly responsible for the increased labor cost; for the finer job of machining and the closer tolerances cost more money to execute. All of this has made it necessary, if costs are to be cut, to machine more accurately and more rapidly by the use of automatic mechanisms. We are now thinking of machining parts by using operations which were never considered to be possible except by the use of hand methods. We are also machining parts automatically which had never seemed feasible to machine outside of the use of standard machines with intricate setup problems. In the days to come, we may have new machining processes which will be just as interesting for people fifty years hence to look at in retrospect and marvel at the changes that have been made."

Machine Tools One Third More Efficient Than War-Time Units

A. G. BRYANT

Vice president, Cleereman Machine Tool Co., Green Bay, Wis., and president, Bryant Machinery & Engineering Co., Chicago: "American machine tool industry, now at the pinnacle of its technological development, can either aid our nation's economy and security or it can become impotent because of public misunderstanding and neglect. There is no more effective means for combating high manufacturing costs or solving world shortages than utilization of new model machine tools. A recent survey shows them to be on an average at least one third more efficient than those used during the war.

"Despite these facts, purchases of 'world's best investment' are hampered by doubts as to corporate tax policies, restraining influence of archaic depreciation policies and lack of understanding in the 'front office' as to the phenomenal returns obtainable.

"It is estimated that 90 per cent of the 1,750,000 machine tools in use in the United States are of designs more than ten years old. Replacement of these machines would increase American metal working plant efficiency by at least 50 per cent. Such an undertaking, on the basis of present capacity of the machine tool industry would require 15 years. Yet at present rate of production without considering any further expansion of American industry, at least 30 years will be required.

"Our military security admittedly is based on our ability to produce weapons for defense. National Security Resources Board has announced that the machine tool industry—in event of an emergency—will be required to produce, in one year from the day of attack 100,000 machine tools.

"Such planning is without practical value when the machine tool industry is permitted to sag to such an extent that it would take at the present time nearly one year to get it set to produce at the rate specified.

"If American industry right now was encouraged by sound tax and depreciation policies to invest in new model machine tools, a substantial volume of busines

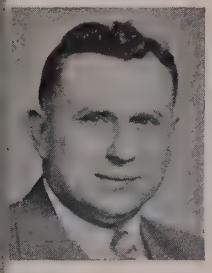
ould be assured. If private industries of Europe were ermitted to purchase American machines through ECA the rate now needed for rehabilitation, that added olume also would do a lot toward strengthening our rimary industrial bulwark."

Progress in Standardizing Gears and Speed Reducers

RUSSELL C. BALL

President, Philadelphia Gear Works Inc., Philadelphia: "Gear manufacturers have made considerable progress during the past year in their program of standardization of gears and speed reducers. Improved methods of cutting and finishing gears, he selection of material and heat treating, lubrication nd bearing mounting has made possible the redesign of any types of speed reducers, with an appreciable increase in both thermal and mechanical ratings.

"Many designs employing these new developments are ow in production, this being especially true of gearmoors, worm gear units and spiral bevel speed reducers. ear tooth shaving and grinding has become a must for uite smooth running gears and while this method of finshing the teeth of gears has been used extensively in the anufacture of aircraft, automobile and machine tool ears, it is becoming more in demand for general industrial use".



New Era for Die Threading Seen with Carbide Chasers

W. J. GRIMM

Secretary and assistant to general manager, Jones & Lamson Machine Co., Springfield, Vt.: "The new defense program initiated during the present year has brought about some very interesting developments in both machining and inspection of et turbine blades.

"Difficulty of machining the blades due to the material specifications necessary to resist the high heat to which these blades are subjected leaves no alternative xcept grinding.

"The holding end of the bucket or blade is generally f the Christmas tree or fir tree type and must be achined in proper relation to the foil section. To meet his problem, we have developed a special optical proection machine which permits chucking on the holding nd of a cast or forged bucket and, by means of a tracng mechanism used in conjunction with the projection ystem, blade foil section is oriented and inspected.

"If approved, a slide which supports a shuttle is rought forward so that the shuttle envelopes the foil ection of the blade. Molten Cerro metal is poured into he shuttle thus casting the foil end securely in the huttle and leaving the holding end exposed for future achining operations. The exterior of the shuttle can e of almost any desired shape for accurate and rapid ocation for future operations. A square shuttle is recmmended.

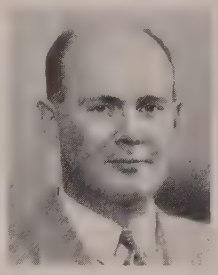
"Our company has developed a dual wheel automatic hydraulically operated vertical slide grinding machine for grinding both sides of the holding end at once.

"The shuttle containing the cast-in blade, as taken from the comparator, is placed in a hydraulically operated clamping fixture on the vertical slide grinder where the holding end is ground accurately at high production using either the diamond dressed or crush dressed wheel method.

"During the past year, we have done a considerable amount of die threading by means of carbide chasers. One of the numerous examples is a ¾-inch-10 national coarse thread cut in mild steel at 2000 revolutions per minute.

"Advantages of carbide die threading will not be available to all for the reason that the machine must be in good alignment. Also, proper spindle speeds and sufficient power must be available. In addition to higher production, we have reports indicating from ten to one hundred times the normal chaser life.

"While carbide die chaser applications are still in the selective-job stage, it is only necessary to see one job run properly to realize that a new era has been opened for die threading."



European Machine Tool Capacity Still Inadequate

RALPH J. KRAUT

President, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.: "The American machine tool industry today is preoccupied with the possibilities of export business through the Marshall plan and I am optimistic enough to believe that substantial amounts of business will materialize. Needs for machine tools abroad, especially in Europe, are considerable and the foreign capacity to meet the demand is still inadequate. However, the English machine tool industry is generally running at capacity; the Germans, believe it or not, are coming back fast; and most countries of Europe, including Russia and her satellites, are rapidly building up their machine tool industries. To me this means increasing foreign competition, year by year, especially when you realize that foreign prices are considerably below ours—not to mention the dollar shortage. I base these observations on my trips to Europe in 1946, 1947 and 1948 through some twelve countries.

"Therefore, I believe our machine tool industry must still look principally to its large domestic market, which will necessitate more intensive research programs to solve not only engineering problems but also shop manufacturing techniques. Although large domestic capital expenditures for machine tools haven't been what they should be during the past few years, the relative need for replacement of machinery is still advisable and, in many cases, imperative.

"Development of many new consumer and capital goods products, improvement in quality of product, and the search for reduced manufacturing costs are still the prime reasons for buying new equipment. This has a tremendous effect on the design of machine tools and small tool equipment. New methods of machining are required for the new products; greater accuracies and better finishes are desired; minimum effort on the part of the machine operator is necessary. All these have brought into the designs greater need for more exact

functioning of machine tools to insure the operator of proper locating and sizing, and while it is true that many of the manufacturers have attempted to avoid complicated hydraulic and electronic devices, constant progress is being made in both systems to simplify the designs and still produce the exacting requirements needed.

"So far as horizontal boring, drilling and milling machines, planers, vertical boring mills, and planer-millers are concerned, the trend is definitely toward higher horsepowers and rigidities to obtain greater cubic inch material removal per minute; increased speeds to permit greater use of cemented carbide cutting tools; improvement and simplification of machine controls to reduce operator fatigue and errors; improved means of measuring and positioning, including automatic and semiautomatic operation to facilitate repetitive manufacture and reduce cost of small lot production; prevention of wear and misalignment by heat treatment of substitute materials in way surfaces, gearing and the like; standardization of tool holding devices to permit use of the same tools on different types of machine tools; increased standardization of parts and units in machine tools to reduce cost of manufacture and to facilitate servicing; improved safety devices, especially electrical and mechanical, to protect the machine against accidents or faulty operation; and, last but not least, a general overall improvement in the appearance and finishes of machine tools."

Full Use of Carbides May Mean New Machine Designs

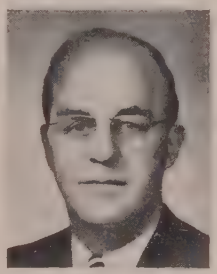
LLOYD D. McDONALD

President, National Machine Tool Builders' Assn. and vice president, Warner & Swasey Co., Cleveland: "Subject of technical progress in metal working is certainly a big undertaking and volumes could be written on the developments and trends now present. It appears to me, however, that there are certain definite situations which will undoubtedly influence the future progress of metal working.

"In the first place, we are just about coming into full realization of the possibilities of the use of tungsten carbides of various types and grades. During the war many stunt things were done with carbides of various kinds, but not many of these applications have found their way into peacetime manufacturing operations for reasons which you will fully realize.

"To go beyond what has been developed as good practice in the most progressive shops and adapt their stunt uses of carbides would require much more than a change in machine design. It would go back into forging practice and material development such as elimination of scale and more close control of forging and casting so that you get less run-out and unbalance. Very definitely as use of carbides becomes more general you will see much higher surface speeds used, and this will call for much higher horsepower. In some cases this may require the redesign of head stocks and also the installation of various means to control automatically and carry away chips. If some day it becomes possible to adapt some of the stunt uses of existing cutting media to everyday practice you may see some quite revolutionary machine designs involving more automatic features than are present today.

"There has been a great concentration of design on the requirements of the mass production industries and the necessity of reducing high labor cost through the use of automatic machinery and electronic devices, but the small shop cannot and will not be neglected, where the high price of such equipment and the small demand for its use will not justify its installation. In the more universal type of equipment there is a definite trend toward more ease of operation and toward more mechanical handling of the machine in which know-how is transferred somehow from the operator to the machine. In other words, through pre-setting of speeds and feeds the human element can be largely removed."



Intrinsic Value of Machine Tools Continually Increasing

ROBERT L. GIEBEL

President, American Machine Tool Distributors Assn. and also Giebel, Inc., New York: "During the past few years, production problems presented to the machine tool builders include many time consuming operations and factors formerly considered unimportant, such as moving parts to and from the machine, chip disposal, lubrication refining, operation inspection, and operator's fatigue. Actual cutting time has been reduced so greatly that these now emerge as significant cost factors.

"Major improvements have been made giving greater production, more accuracy, and longer service. Steel plates are cut to shape, assembled and welded, to replace large expensive castings. Alloy steels permit the use of smaller shafts, gears, and wearing surfaces; yet increase both the strength and life of the mechanisms. Aluminum castings are used instead of cast iron where weight is objectionable. Hydraulics, fluid motors, and electronic controls increase flexibility and eliminate expensive variable speed motors and cumbersome gear boxes. Ball and roller bearings on hardened ways are often substituted for the power consuming scraped surfaces. While adopting these changes and retaining accessibility and unit construction, machines are improving in appearance—designers are streamlining and freely using plastic and stainless steel trimmings. Thus, value of machine tools is continually increasing. Properly used they are 'The World's Best Investment.'"

Buyers Select Machines for Own Needs, Not Other Fellow's

H. P. CHAPLIN

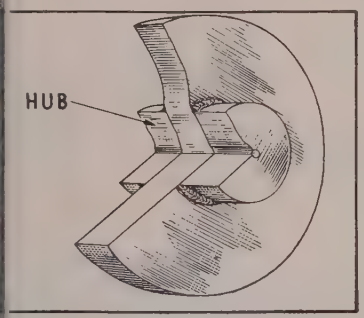
Treasurer and general manager Cone Automatic Machine Co. Inc., Windsor, Vt.: "Although the trend of opportunity for the multiple spindle automatic bar machine now includes short runs, as well as long runs, the one outstanding factor that will always determine the efficiency of a machine of this type is its dependability of operation.

"Considering the variety of work, the specifications and various conditions under which it performs, the machine has a favorable service record compared to the average type of production tool.

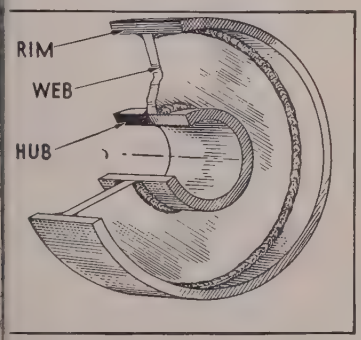
"Requirements of the 'automatic' have increased from

Design Ideas to Cut Costs of Wheels, Gear Blanks, Pulleys

THE examples shown are typical of the different ways in which wheels, gear blanks and pulleys are being built with arc welding. These basic designs can be modified to suit your production needs, depending upon the quantity to be made and the kind of fabricating equipment available.



. 1. *Simple gear blank* is made by fillet welding hub to the web. Parts are flame cut from el plate.



. 2. *Alternate design.* Hub is machined from ing and rim is rolled from steel strip. Hub l rim are fillet welded to web.

. 6. *Handwheel.* Rim is formed from round bar k or tubing. Spokes are plain round stock. el handwheels will not fracture from impact.

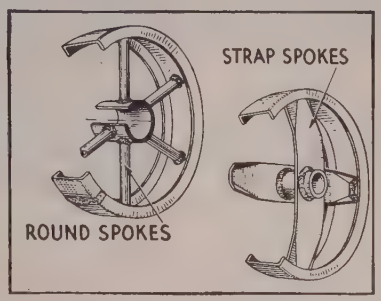


Fig. 3. *Low cost wheel* is made with spokes formed from round bars or steel straps. Spokes are fillet welded inside the channel rim. Hub if required is produced from steel tubing.

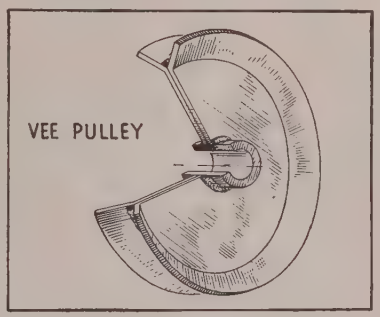


Fig. 4. *Pulley* is fabricated from two steel discs formed to produce a vee-shaped rim.

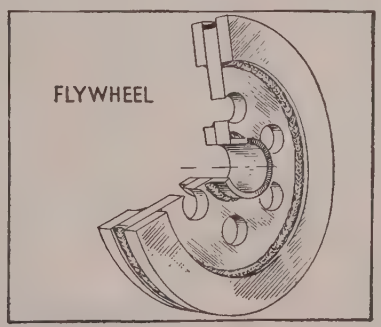
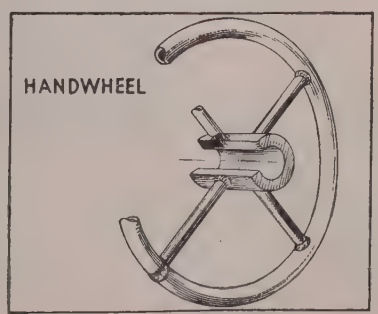
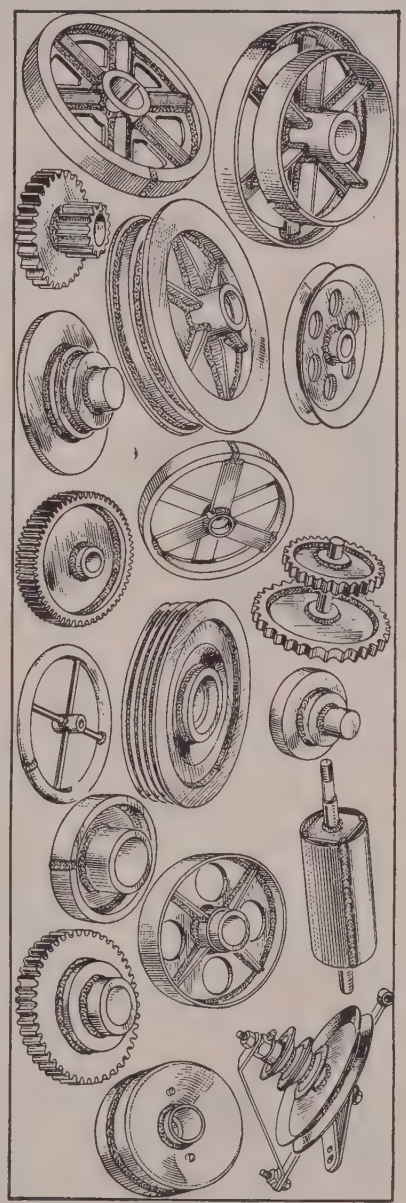


Fig. 5. *Flywheel* is made by welding two steel rims to web by a single groove weld. With welded design, metal is concentrated where it is needed most . . . at the rim.





Detailed information on the design of all types of machine parts is contained in the "Procedure Handbook of Arc Welding Design and Practice." Price $1.50 postpaid in the U.S.A.; elsewhere $2.00.

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year to year, which obviously places greater responsibility on the machine and its builders. The elimination of second handling operations no longer confines the 'automatic' to special tools and attachments for broaching, cross milling, cross drilling, multiple hole drilling and tapping, etc. An operation, as remote as heat treating, has been accomplished in one tooling position of an otherwise normal tool-up.

"More good 'eggs' will continue to be placed in the production basket of the machine that is designed and built to keep the basket right side up. Better materials and methods, better engineering, more selective and efficient buying, selling, and servicing, make yesterday's phrase—'one spindle down so with all four'—obsolete.

"Modern buyers are trained to choose machines that meet the needs and conditions of their own plants—not the other fellow's. Today, with less attention and at greater speeds and feeds, more profitable production is rolling down the chutes of 6 or 8-spindle automatics than could ever have been dreamed of from 'fours.'"

New "Trade Tools" Will Incorporate Cemented Carbides

W. G. ROBBINS

President, Carboloy Co. Inc., Detroit: "During the past year, there has been important progress in the use of hard metals (cemented carbides) for 'end products'. The list of such end products now runs up into the hundreds and ranges all the way from minute bearings of cemented carbide for smoother, more trouble free operating fishing reels to large molds, sheet metal dies, etc. Productionwise output of carbides during the past year was about eight times that of 1940, the last 'peace-time' year.

"A number of 'trade' tools featuring the use of cemented carbide are now widely accepted in their respective fields. These include paint scrapers, knife and scissors sharpeners, masonry drills, dental drills, etc. Thus carbide products are now being marketed even through the medium of retail stores. During the coming year, it is quite likely that several additional trade tools depending on carbides to give them better performance, longer life, etc., will make their appearance. A number are under development and look very promising.

"Outstanding during the year, although even yet not fully developed, is the growth of use of cemented carbides in the mining field. Carbide rock drilling bits are now being used for all types of mining, quarrying, tunneling and highway and dam construction—not only in the United States, but also in Canada, Mexico, South America, Europe and Africa. Chief reason for the rapid development in this field is the lowering of drilling costs—reported cut as much as 50 per cent for an eight months' period by one company, exclusive of savings in air consumption and blasting powder.

"New types of carbide tools also have expanded carbide utilization even in metal working. For example, 'all-purpose' carbide drills, resembling somewhat the well-known gun-drill have been added to twist drills and have opened up new possibilities in drilling both deep and shallow holes with carbides.

"Extent to which carbides and carbide products are now accepted by industry is evidenced by the fact that there is hardly a major or minor industrial section of the nation, today, where carbide products are not being handled by conventional distributors, in addition to the direct representatives of carbide producers."

Constant Investment in Better "Tools" Path to Profits

PHIL HUBER

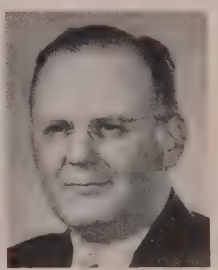
President and general manager, Ex-Cell-O Corp., Detroit: "With the metal working industry making up approximately a third of all industry in the United States, any decided trend in metal working can't help but influence our productive economy.

"Already gathering momentum in this field is a trend that is of vital importance to progressive management. It is based on the proved theory that to be successful in maintaining an adequate profit, a manufacturer must constantly be prepared to make an investment in better equipment.

"In fact, the well known threefold objective of modern manufacturing—more production, higher quality, lower cost—often is accomplished in direct ratio to the modernization of a company's machinery. Frequently, too, unavoidable increases in the cost of doing business are at least partially offset by what is gained through the installation of new and improved machine tools.

"It is no exaggeration today to say that one of the most practical and hopeful avenues to explore for possible reduction in manufacturing costs is that leading to a greater use of modern high production machine tools, particularly special-purpose. This tendency in industry to seek out new opportunities for the application of today's highly productive machine tools is increasing.

"Higher production, more accuracy and lower costs naturally require the use of higher speeds and feeds. For instance, only with new and improved machine tools can developments in carbide cutting tool applications be taken full advantage of, demanding as they do quite a substantial increase in horsepower. This calls, in turn, for greater rigidity in the construction of machine tools in order to maintain the highest degree of accuracy. All of this is reflected in the design of today's machine tools including rotary index, trunnion and transfer-type machine tools, with self-feeding hoppers and automatic chip conveyors, all reducing operator's time and effort."



Design for Less Production Down Time—Important Factor

JOHN E. BARBIER

Sales manager, Murchey Machine & Tool Co., Dayton, O.: "For value and maximum dividends from a machine tool investment come only from use of modern, efficient metal removing tools. Benefits from a machine tool investment can only be realized on the basis of the total number of hours per day the machine can actually produce parts.

"We are convinced that design for minimum production down time is fully as important a factor as low chaser life, low tool maintenance, and other accepted requirements. Because of the nature of threading operations, chasers must be replaced at relatively frequent intervals. Our engineers have accordingly designed die heads, both tangent and radial chaser type

Products for the Iron and Steel Industries

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
ALSIFER	Aluminum.....20% Silicon.....40% Iron.....40%	Used principally as a steel deoxidizer and for grain size control.
FERRO CHROMIUM High Carbon Grade	Chromium....66-70% Carbon.....4-6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium....62-66% Carbon.....4-6% Silicon.....6-9%	For alloyed cast irons. Readily soluble as a ladle addition at the lower temperatures of cast iron.
Low Carbon Grades	Chromium....67-72% Carbon...06%, .10%, .15%, .20%, .50%, 1.00% and 2.00% max.	For low carbon chromium steels, especially those with high chromium content, such as stainless and heat-resistant types.
FERRO SILICON 25-30% Grade	Silicon.....25-30%	Deoxidizer for open hearth steels; also for high silicon, corrosion-resistant iron castings.
50% Grade	Silicon.....47-52%	Used as a deoxidizer and for the addition of silicon to high silicon steels, for springs, electrical sheets, etc. Pulverized form used as ladle addition to cast irons for silicon content and graphitization control.
75% Grade	Silicon.....74-79%	For high content silicon steels, such as spring steels, sheets and forgings of high magnetic qualities for electrical apparatus.
High Silicon Grades 80-85% 85-90% 90-95%	 Silicon.....80-84.9% Silicon.....85-89.9% Silicon.....90-95%	 For high content silicon steels where small ladle additions are used for required silicon content. Also for manufacture of hydrogen by reaction with caustic soda and production of magnesium by the Pidgeon process.
FERRO TITANIUM High Carbon Grade	Titanium.....15-18% Carbon.....6-8%	Final ladle addition to control "rimming" action and to clean effervescing steel. Final deoxidizer and scavenger for steel castings and fully killed ingot steels.
Medium Carbon Grade	Titanium.....17-21% Carbon.....3-4.50%	Often preferred to the High Carbon Grade as a final ladle addition to very low carbon rimming or effervescing steels.
Low Carbon Grades 20-25% Ti Grade	Titanium.....20-25% Carbon...max. 0.10% Silicon.....max. 4% Aluminum max. 3.50%	Carbide stabilizer in high chromium corrosion-resistant steels of extremely low aluminum content. Deoxidizer for some casting and forging steels.
40% Ti Grade	Titanium.....38-43% Carbon...max. 0.10% Silicon.....max. 4% Aluminum...max. 8%	Carbide stabilizer in high chromium corrosion-resistant steels, where smaller ladle additions are desired and extremely low aluminum content is not essential.
VANADIUM METAL 90% Grade	Vanadium....91.15% Aluminum.....2.25% Silicon.....0.50% Carbon.....0.17%	For special iron-free (nonferrous) or low iron alloys or low impurity ferrous alloys.
95% Grade	Vanadium....95.18% Aluminum.....2.00% Silicon.....0.27% Carbon.....0.40%	Principally for research on the properties of pure alloys, where very low iron content is essential.

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
FERRO VANADIUM Grade "A" (Open Hearth)	Vanadium....35-45% Silicon.....max. 12% Carbon...max. 3.50% Vanadium....50-55% Silicon...max. 7.50% Carbon...appr. 1.00%	For low percentage vanadium content of rolled, forged or cast constructional steels. Also used in vanadium cast irons.
Grade "B" (Crucible)	Vanadium....35-45% 50-55% Silicon...max. 3.50% Carbon...max. 0.50%	For tool steels and special high vanadium steels in which required limits for carbon and silicon are narrow.
Grade "C" (Primos)	Vanadium....35-45% 50-55% 60-65% 70-80% Silicon...max. 1.25% Carbon...max. 0.20%	For tool steels and special steels requiring high percentages of vanadium and exceptionally low carbon and silicon content.
VANADIUM PENTOXIDE Technical Grade Fused Form	V_2O_5.....90%	A source of vanadium in basic electric furnace steels. A base for numerous chemical compounds.
Technical Grade Air Dried Form	V_2O_5..... 83-85%	A base for preparation of numerous chemical compounds (catalysts, etc.).
GRAINAL ALLOYS Vanadium Grainal No. 1	Vanadium....25.00% Aluminum....10.00% Titanium.....15.00% Boron.....0.20%	Practical and economical intensifiers for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties.
Vanadium Grainal No. 6	Vanadium....13.00% Aluminum....12.00% Titanium.....20.00% Boron.....0.20%	See above.
Grainal No. 79	Aluminum....13.00% Titanium.....20.00% Zirconium.....4.00% Manganese....8.00% Boron.....0.50% Silicon.....5.00%	See above.
GRAPHIDOX No. 4	Silicon.....48-52% Titanium.....9-11% Calcium.....5-7%	For graphitization of iron; ladle treatment insures normal graphite, free from dendritic structure; reduces chill; efficient inoculant in production of high strength irons.
V-FOUNDRY ALLOYS V-5 Grade	Chromium....38-42% Silicon.....17-19% Manganese....8-11%	Used in cast irons as a ladle addition. Reduces chill, promotes uniformity of structure, increases strength and hardness.
V-7 Grade	Chromium....28-32% Silicon.....15-21% Manganese...14-16%	See above.
BRIQUETTES Ferro Chromium	Hexagonal. Weigh approx. 3⅜ lb. and contain 2 lb. of chromium.	A practical and convenient form for adding ferro-alloys to the cupola.
Ferro Silicon	Two sizes, both cylindrical, one containing 1 lb. of silicon; the other, 2 lb. of silicon.	See above.
MISCELLANEOUS	Special ferro-alloys, metals, chemicals and carbides.	To meet individual requirements.

VANADIUM CORPORATION OF AMERICA
420 LEXINGTON AVENUE, NEW YORK 17, N. Y. — DETROIT — CHICAGO — CLEVELAND — PITTSBURGH

so that chasers may be changed quickly and easily with a minimum of machine stoppage.

"More recently, however, we have developed collapsible taps with quick change chasers. It is no longer necessary to remove the chaser cap or front plate when changing chasers.

"Our standard machine taps and receding pipe taps in sizes 2½ inches and larger can now be furnished with individual spring loaded plungers holding each chaser against the center bearing pin. When changing chasers these plungers are withdrawn from the chaser slots with a small hook, allowing replacement in a matter of seconds.

"Our type 'L' machine taps, which have positive retraction type chasers, can now be arranged for quick change in all sizes. On the type 'L' tap, the bearing pin is moved out of its normal operating range by means of a lever designed for the purpose so that slots on the back of the chasers are out of contact with the hooks on the bearing pin. Chasers can quickly be removed and replaced in this manner without disturbing the front cap. This quick change feature in no way interferes with the normal operation of the tool while in production."

Industry "Not of Age" But on Verge of Production Efficiency

HARRY E. CONRAD

Executive secretary, American Society of Tool Engineers, Detroit: "We read and hear a great deal about new horizons having been reached in production and industrial processes. We are informed, quite positively, that certain tools or, in some cases, whole industries have 'come of age.' Often these bland statements are made in such a manner, and with such impelling finality, that one might be led to believe we had reached the acme of perfection . . . that the paragon of efficiency had been attained . . . and that further improvement in the particular field was not only improbable, but virtually impossible.

"Many of us who have observed the developments in industry over the last 30 or more years have come to look on such commentaries as idle and unthinking speculation emanating from individuals who are the most casual observers.

"Actually, we are just now on the threshold of manufacturing efficiency. We have barely scratched the surface in the field of industrial mechanization. We have a grasp of the general principles, but we haven't filled in the gaps. I make these statements advisedly, considering all of the improvements in methods and processes that could be made, in the light of those that have been made in the past half century.

"One of the factors which will give impetus to faster development of better methods and better tools is the fact that we in America have committed ourselves to precision manufacture. In the past, we have left much of the precision work to the comparatively manual methods of countries where craftsmanship was of high grade, but labor was relatively cheap.

"Indications are that the labor force will be further increased. Certainly, with closer tolerances and more complex equipment with which to work, better trained engineers, mechanics and supervisors will be necessary. This calls for far-sighted programs in our technical societies and in our technical schools and colleges. The American Society of Tool Engineers intends to meet this challenge.

"There appear to be two deterring influences which need correcting before we can move forward at the speed present conditions seem to indicate that we should. First, in spite of all that has been written and said on the subject, and in spite of the common sense that should be exercised, there is still a disposition on the part of some to believe (and preach) that mechanization decreases employment. It is up to industry to dispel this fallacy; and second, the depreciation policy on capital goods for tax purposes now in vogue by pressure from the Treasury department is not conducive to taking advantage of forward developments as they are made. Industries are, therefore, hampered with obsolescent and outmoded machines and equipment. Under the existing policy, manufacturers are prone to say: 'We can't afford to purchase a new piece of equipment . . . we haven't written off the old one yet.'

"It is up to industry and to its engineers to convince the Treasury that this policy is short-sighted. The Treasury should first consider the national interest before it dwells on how much taxes it will collect this year. It should, therefore, take into account that what this country needs most is maximum, efficient production.

"Our index for depreciation should never be the average useful life of a machine, as the Treasury department would have it, but rather the profitable life of a machine."

Changes in Tool Selection Greatly Reduce "Hidden-Costs"

K. R. BEARDSLEE

Vice president and marketing manager, Carboloy Co. Inc., Detroit: "Recent economic trends in industry, continuously raising the level of production which a company needs to begin making a profit, have begun to focus major attention on 'hidden costs.' During the past year much attention was given to eliminating costly materials handling methods. During the coming year much attention will be focused apparently on the hidden costs related to the use of cutting tools.

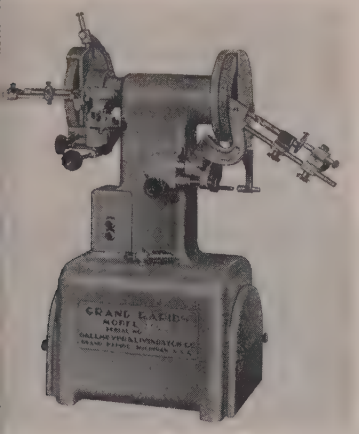
"Studies of industrial costs have revealed that there probably is no greater truism when talking about cutting tools than the old expression 'it's not the original cost, but the upkeep.' However, when it comes to cutting tools, the figures are really startling.

"One study showed that changes in tool selection, application, and upkeep generally could easily reduce hidden costs by ten times the cost of the tool, itself. Thus in a company using, say, $50,000 worth of tools a year scientifically coordinated tool control could easily cut hidden costs by many hundreds of thousands of dollars annually, and might spell the difference between a good profit and a loss—particularly if the company is operating close to its break-even point.

"Reason for this is of course traceable in large extent to the vast increase in labor costs. Among the hidden costs directly related to cutting tools are the following: Tool life, productivity of the tool per hour, time spent in re-grinding tools, for a given amount of work, time spent in changing tools (idle machine time), and cost of tools required for a given production."

p and Drill Grinder

nnounced by Gallmeyer & Living-n Co., Grand Rapids, Mich., is new line of combination tap and ll grinders, one of which, style -1, is illustrated. Capacity of this del for sharpening taps is from



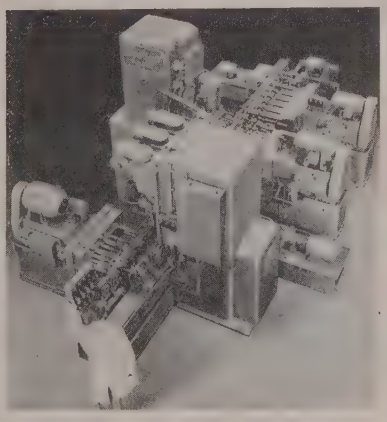
. 6 to 1½ inches and twist drills m ⅛ to 1½ inches. Machines are ilt around a heavy one-piece column d base casting machined, to take eased-for-life ball bearing spindle. The bearings have built-in shields retention of lubricant and exclu-n of grit and dirt. Spindle is driven rough V-belts by a NEMA frame ll bearing motor housed in the base. ther right or left hand two, three four-flute taps may be sharpened th equal facility. Tap grinding heel may be dressed with a diamond ing device. Twist drill grinding tachment is suitable for sharpening o, three or four-flute drills of either raight or taper shank type. Drill inding wheel also has a truing de-ce.

rolley Conductor System

Benbow Mfg. Co., P. O. Box 589, edwood City, Calif., is producing e Trac Troly mobile electric sys-m which has a current pick-up of e caterpillar type. The system is mprised of two primary units: The sulated conductor bar and the aveling collector or current pick-up. pper conductor bar is encased in rubber sheathing with slotted rec-ngular openings on the under side. penings are such size and shape as make even intentional contact with e conductor bar difficult. Insulation around the conductor bar retained and supported by an aluminum I-beam, suspended by brackets at 5-foot intervals. Traveling collector is encased in a bakelite cover. Current is picked up from the conductor bar by an endless chain of teeth which make contact with the bar through the recesses in the bottom of the insulation. There is no wearing action on the insulation and a slight wiping action between teeth and bar keeps the conductor free of dirt and oxidation. Five teeth are in contact with the conductor at all times. Various capacities are offered.

Multioperation Machine

Fourteen operations are performed simultaneously on a total of 28 transmission gear shift housings with the new special machine tool completed

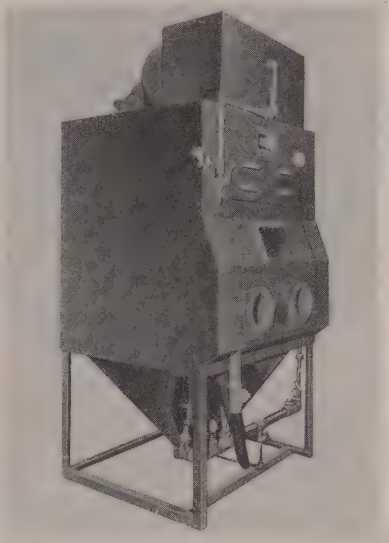


by Cross Co., Detroit, Mich. Called the Transfer-Matic because of its continuous automatic material handling feature, the machine has a production rating of 175 pieces per hour at 80 per cent efficiency.

A minimum of physical and mental effort is required on the part of the attendant. By pushing the control button the machine takes over, automatically transferring, locating, clamping and machining the parts progressively, two at a time. Interchangeability of standard Cross self-contained units and easy accessibility of wearing parts assures low maintenance and minimum down time.

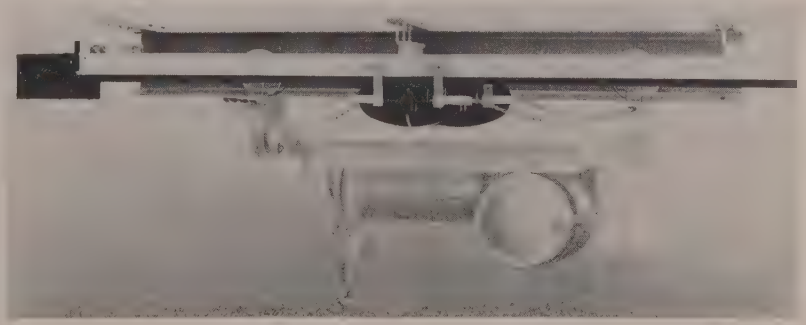
Metal Cleaning Machine

Armstrong Chemical & Machine Co., Painesville, O., recently introduced a Jet Blast machine for wet abrasive blast cleaning and finishing



of metal surfaces. Rust, scale and undesirable metal particles, such as feather edges on sharpened tools, may be removed by projecting a slurry of fine abrasive suspended in water against the surface to be cleaned. Using a wide variation in abrasive size (60 to 1250 mesh) it is possible to produce finishes as low as 2-3 microinches rms.

Machines are contained in a 30 x 30 inch cabinet, 77 inches high, having one blast nozzle and an exhaust blower connected to a ¼-horsepower motor or in a 48 x 42-inch cabinet,



108 inches high, with one to eight nozzles and exhaust blower connected to a 1 horsepower motor. The jet siphon principle is used for transferring the grit slurry. The only wearing parts are the blast nozzles. Machines are self-contained, fitted for connection to shop compressed air lines.

Stamping Trimmer

Mild steel up to 1/16-inch thick can be cut with the light duty stamping trimmer announced by the Quickwork Division of Whiting Corp., Harvey, Ill. Known as the 48-L, it

is an adaptation of the company's standard heavy duty machine and is designed to bring machine trimming to the smaller shops and job shops.

Provision has been made for constant or variable speed drive as preferred. Drive is through a differential type transmission which permits use of rolls or cutters of different diameter without variation in peripheral speed.

Universal Load Cell

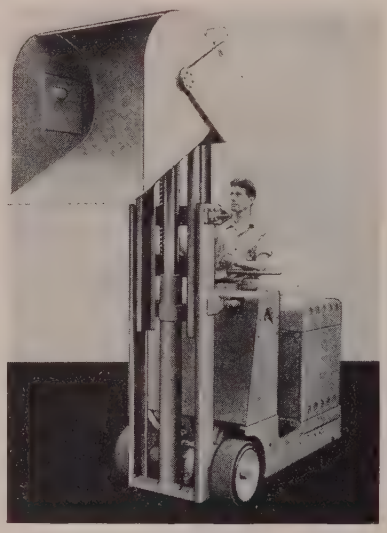
Tension and compression loads can be measured with the SR-4 type U load cell developed by Baldwin Locomotive Works, Philadelphia 42, Pa. The pick-up elements are resistance wire strain gages which are bonded to a steel load-responsive member and hermetically sealed within a rugged cylinder. Dimensions of this member change slightly under load, increasing or decreasing the wire length of the gages and thus changing their electrical resistance. This change is calibrated in units of weight which may be used to actuate relays or control mechanisms, or they may be indicated on a dial or recorded on a chart.

Fittings for tension or compression loads are attached in female threaded connections in both ends of the cell. It can be used when loads reverse between tension and compression. Four load capacities are offered: 500, 2000, 10,000 and 50,000 pounds.

Truck Dump Bucket

Granular chemicals, coal, scrap metals and other bulk materials may be handled with the dump bucket attachment for Standrive power fork trucks made by Lewis-Shepard Products Inc., 273 Walnut St., Watertown 72, Mass. Load is dumped by a releasing latch. When empty, bucket returns itself to locked upright position only upon being completely lowered.

With the attachment, the operator can control every operation incident



to loading and dumping without moving from his place in the corridor of the truck. Bucket is of arc welded heavy gage steel plate. Alloy steel leading edge is beveled for easy scooping of load, and heat treated to stand up under rugged service. Scoop itself is mounted on self-lubricating bronze bearings. It is available in capacities according to character of materials to be handled.

• • •

SHIM STOCK WALL RACK: Laminated Shim Co., Glenbrook, Conn., offers a metal wall or bench rack which holds any four gages of the company's 6 x 100-inch brass or steel stock rolls.

COMPARATOR: A new pocket-size surface roughness comparator for sight and feel comparison with machined finishes is offered by General Electric Co., Schenectady, N. Y. It is composed of two small metal rules that illustrate degrees of roughness.

CUTTERS: H. K. Porter Inc., Somerville 43, Mass., announce three cutters: A shear cutter for cutting steel strapping, wire stay and box wire; a wire cutter for soft wires, rods and ¼-inch bolts; an angle cutter for close cutting of cotter pins, rods, bolts, etc.

ICE MELTING POWDER: Speco Inc., Cleveland 9, O., announces a new ice and snow-melting chemical powder that eliminates the necessity for chipping or shoveling. Ice Rem is recommended for keeping drives, loading platforms, etc. free of ice.

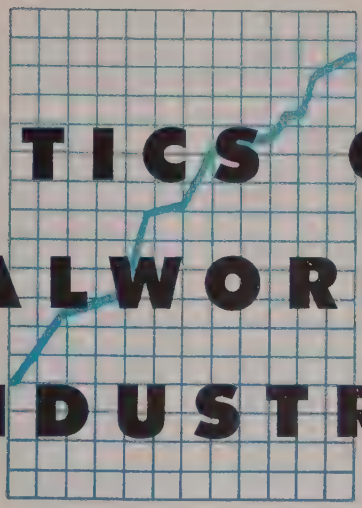
BATTERY CHARGERS: A new line of electronically controlled and regulated floating battery chargers for power stations, communications and other applications requiring accurate control of floating voltage, is offered by Power Equipment Co., Detroit 2, Mich. Chargers are fully automatic in operation, have constant potential output and are designed to maintain floating charge on the battery group to within plus or minus 1 per cent.

INTERCOM CIRCUIT: New circuit, offered by Executone Inc., New York 17, N. Y., combines co-ordinated operation of a Trumpet type paging reproducer and two-way Staff station for use in either intercommunication or sound systems. With this unit, it is possible to answer paged messages from high noise level areas clearly.

LATEX, PLASTIC COMPOUNDS: A new latex compound designed for applications requiring high heat resistance and a new series of plasticols are announced by American Anode Inc., Akron, O. Designated as Anodex HR latex and Ameran resin paste, these products may be used for coating metal and wire, plating racks, pipe lining wood, industrial boots, gaskets, casting film and sheeting.

ELECTRIC POLISHER: Bradford Machine Tool Co., Cincinnati, O., offers a new 10-inch vertical type portable electric polisher, designated as model 109. It is driven with a universal alternating or direct current 110 volt meter, 25-60 cycles, 5.5 amperes, at 1000 revolutions per minute free speed; 700 revolutions per minute load speed.

STATISTICS OF THE METALWORKING INDUSTRY



Facts and figures for the ferrous and nonferrous metal producing and consuming industries are presented in the following pages. These include data compiled by STEEL and by numerous other statistical organizations and agencies. Sources of information are indicated in the charts and tables with grateful acknowledgment.

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The Business Trend

THE NEW YEAR will have to be marked with some phenomenal production rates if it is to surpass performance of 1948, for last year industry pushed operations in many instances to record peaks.

Reflecting this high level of activity, the Federal Reserve Board's industrial production index was not only on a high plane all year but in October set a peacetime record at a preliminary 195 per cent of the 1935-1939 average. Similarly, STEEL's industrial production index that month touched a new postwar peak of 179 per cent of the 1936-1939 average and in two weeks of December registered 178. On each of the two indexes the lowest mark of 1948 was substantially above the low point of 1947.

Signs of Leveling Off—At the yearend there were increasing signs of a leveling off of industrial activity, with some fields announcing production cutbacks and price reductions. Caution was increasingly prevalent.

Details of last year's industrial activity in the metalproducing and metalworking fields in comparison with previous periods are provided in numerous statistical tables and charts on following pages (for index, see p. 295). Included are informative statistics concerning productive capacities, consumption, distribution, employment and wages, and prices.

U. S. Produces Half of World's Steel—One of the tables indicates increased production was not confined, however, to the United States. While the estimated increase in production of steel for ingots and castings in the U. S. in 1948 was 3.8 million net tons the estimated rise in total world steel output was 17.5 million tons. However, the estimated 1948 U. S. steel production of 88.5 million tons was slightly more than half of all of the estimated world output of 168 million tons. Meanwhile, the outlook for high production of steel in the U. S. in 1949 was strong, in view of continued heavy pressure from consumers. Although there were instances of easing in requirements, the overall demand remained far above steel productive capacity, even though the latter was being expanded.

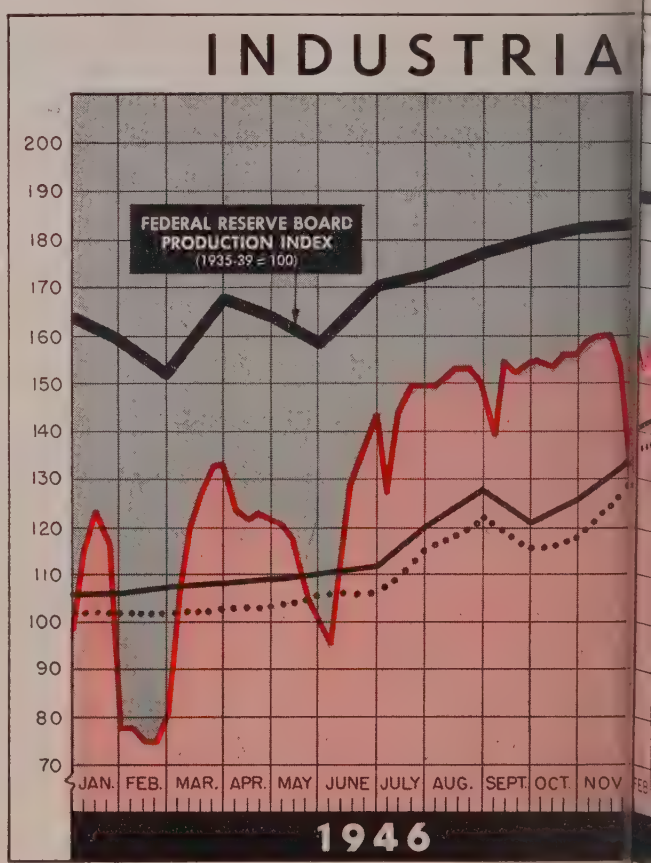
The United States also raised its pig iron output in 1948 about a half a million net tons over 1947, while the estimated world production jumped 13.5 million tons. However, the U. S. accounted for about half, or 60.8 million tons, of the total world output.

Employment Higher—Although there were still insufficiencies during 1948 of some materials, notably steel, many manufacturers, with improved supplies of materials and components and largely free from labor strife, were able to raise their output. Consequently, manufacturing employment and total employment in 1948 climbed above 1947 levels. Manufacturing employment in 1948 averaged 16,203,000 persons per month, while total employment averaged 59,320,000. Although the civilian labor force in 1948 rose above that of 1947 the increase in total employment held unemployment in 1948 under that of the preceding year. As 1948 progressed, unemployment declined from around 2½ million early in the year to only about 1.6 million in the third quarter, with a result the monthly average of unemployment in 1948 was estimated at 2,099,000 persons.

Pipelines Filling—The high rate of production in 1948 helped substantially to fill supply pipelines, and the rapidity with which a balancing of supply and demand can occur was demonstrated to an increasing extent during the year. Some products became progressively easier to obtain. As result there were cutbacks in production of some consumer durable goods, notably household appliances. Even price reductions on some of these lines were made in November and December, right when consumer purchases in preparation for Christmas should have made demand brisk.

An indicator, perhaps, of this trend was a decline in the value of new orders received by manufacturers in October. For manufacturing as a whole, the daily average value of new orders placed that month declined 4 per cent from the September average. The durables group showed new orders in October down 10 per cent from the preceding month, but the decline in the nondurable goods industries was less sharp, being about 3 per cent.

Another example of the return of a buyers' market was provided by castings. Early in 1948 there



was no visible fulfillment of demand, but by the end of the year many jobbing foundries were seeking business and shading prices downward as a sales incentive.

One of the first consumer durables to come into balance with demand was radios. That balancing occurred in 1947 when total output soared to 16,342,002 sets. Reflecting this balancing, production in the first 11 months of 1948 totaled 12,894,755, compared with 14,636,084 in the comparable period of 1947.

Tool Shipments Decline—Machine tools, the supply of which was in line with demand at the end of the war, showed a moderate decline in shipments in the first 11 months of 1948, compared with the corresponding period of 1947.

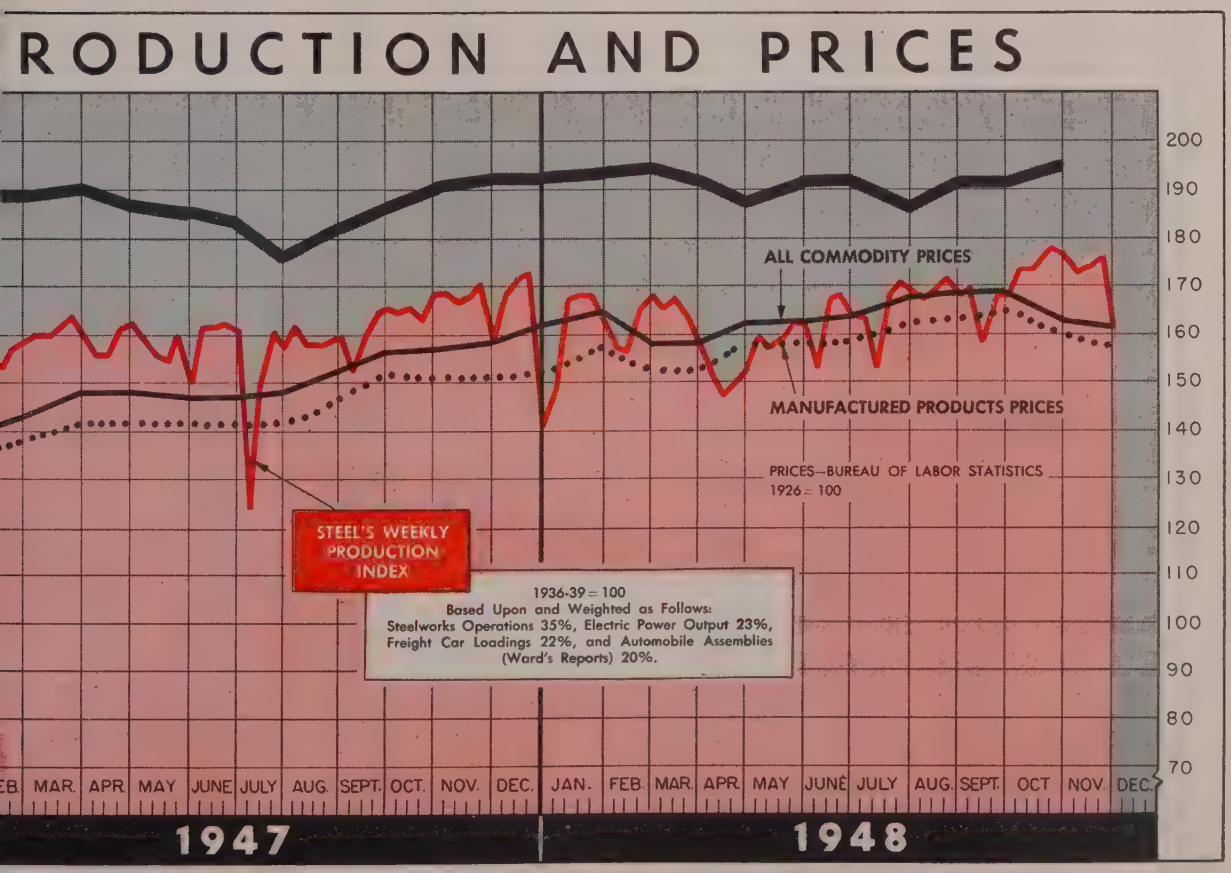
Automobile manufacturers, pushing production in 1948 to the second highest annual level in history, continued to hold large backlogs of orders but toward the yearend there was evidence of increasing buyer resistance, with the demand for special, high-price models easing.

One field in which production had more than caught up with demand was bituminous coal mining. Coal stocks last fall had risen to nearly 70 million tons. A year earlier they totaled only about 50 million tons. A consequence was a reduction in coal output, with resultant laying off of miners.

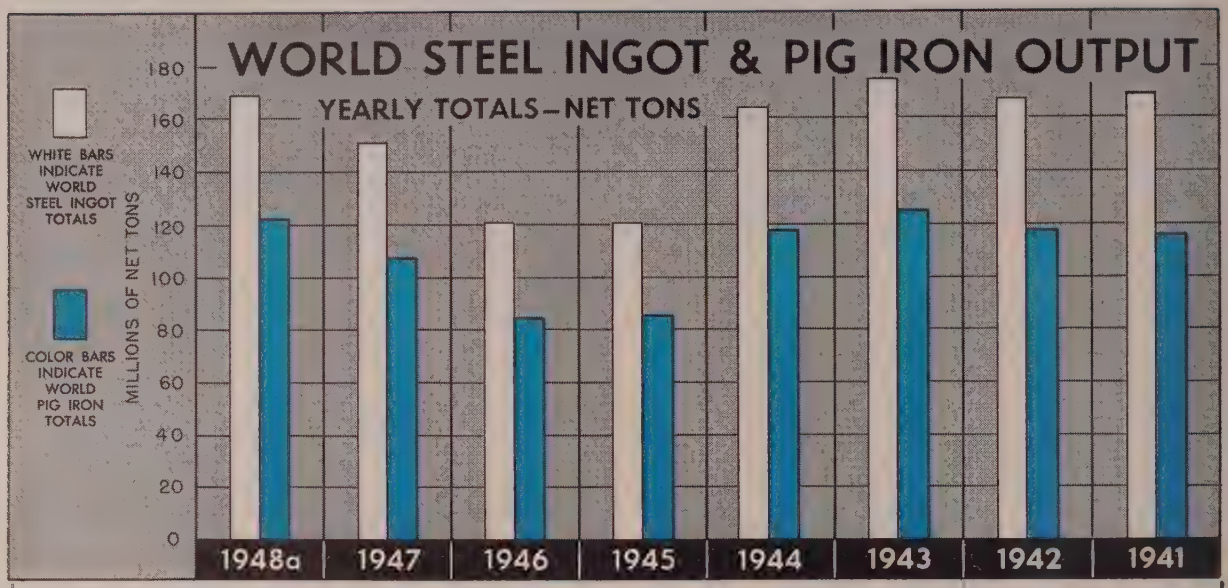
The high level of industrial production and business activity in 1948 required an alltime high volume of electrical energy. Meanwhile, domestic dependence on electricity increased also, and in December a new alltime weekly distribution record of 5,790,191,000 kilowatt-hours was established. In 1947, weekly electricity production exceeded the 5-billion kwh mark only 8 times, but in the first 50 weeks of 1948 there were only 3 in which production was not above the 5-billion level. With much of industry on a daytime shift and a 5-day week, the demand for electricity was concentrated into peaks that in many instances taxed the capacity of generating plants. However, utility companies had substantial plant additions under construction, and a considerable amount of the increased capacity is to become available in 1949.

Inflationary Pressures Ease — Much of 1948 was characterized by rising prices but toward the yearend there was some easing of inflationary pressure, with a result the Bureau of Labor Statistics all commodity price index, which reached a postwar peak level of 169.4 per cent of the 1926 average in mid-September, turned downward for the rest of the year. A similar pattern was followed by manufactured products prices. The inflationary character of the economy was sufficiently strong to cause a price rise in aluminum, which had been stationary since 1941. Price trends in other nonferrous metals as well as the ferrous were sharply upward in 1948.

Also reflecting the inflationary movement was a rise in wages. In 25 manufacturing industries the average of hourly earnings in the first seven months rose 7 cents.



Production—Distribution—Capacity



STEEL INGOT AND CASTINGS OUTPUT—NET TONS

By Countries	1948 (a)	1947	1946	1945	1944	1943	1942	1941
United States	88,500,000	84,894,000	66,602,724	79,701,648	89,641,600	88,836,512	86,031,931	82,839,259
Canada	3,248,000	2,943,360	2,334,640	2,877,952	3,016,160	3,004,176	3,109,904	2,712,192
Great Britain ...	16,576,000	14,246,400	14,218,736	13,244,000	13,599,264	14,594,720	14,494,704	13,789,664
France (b)	7,840,000	6,318,312	4,858,000	1,831,200	3,407,600	5,650,400	4,944,800	4,748,800
Saar	1,344,000	753,424	Included in Germany					
Belgium	4,256,000	3,186,064	2,517,200	812,000	685,440	1,841,280	1,518,720	1,787,520
Luxemburg	2,688,000	1,887,872	1,426,096	291,200	1,398,544	2,379,440	1,729,168	1,376,480
Italy	2,352,000	1,874,656	1,270,640	436,800	1,130,752	1,903,328	2,131,360	2,352,000
Spain	560,000	597,296	660,800	616,000	700,000	728,000	660,800	632,800
Sweden	1,344,000	1,312,528	1,324,624	1,316,000	1,316,000	1,344,000	1,355,200	1,276,800
Germany (c)	6,160,000	4,744,432	3,318,448	1,705,984	20,187,888	22,877,008	22,570,576	22,962,912
Austria	728,000	394,576	206,080	189,504	1,116,416	1,160,992	988,736	886,480
Czechoslovakia ..	2,912,000	2,519,328	1,842,624	1,047,200	2,802,576	2,770,656	2,570,064	2,552,368
Poland	2,016,000	1,740,144	1,344,000	545,552	2,149,056	2,689,120	2,304,736	2,209,984
Hungary	840,000	657,720	392,000	141,904	573,888	855,680	864,528	861,392
Russia (a)	20,160,000	16,800,000	13,440,000	10,080,000	8,960,000	8,960,000	8,960,000	16,800,000
Japan (d)	1,624,000	1,034,880	700,000	1,173,700	8,099,168	10,061,968	8,704,192	7,287,728
India	1,344,000	1,451,520	1,457,120	1,515,136	1,533,168	1,570,464	1,504,496	1,577,184
Australia	1,344,000	1,370,880	1,124,144	1,573,600	1,784,048	1,912,064	1,903,776	1,886,080
So. Africa	672,000	658,560	555,184	588,448	533,008	460,880	381,584	373,856
Miscellaneous ...	1,568,000	1,344,000	1,288,000	896,000	952,000	1,288,000	1,120,000	840,000
World Total	168,076,000	150,729,952	120,881,060	120,583,828	163,586,576	174,888,688	167,849,275	169,753,499

PIG IRON AND FERROALLOYS OUTPUT—NET TONS

By Countries	1948 (a)	1947	1946	1945	1944	1943	1942	1941
United States ...	60,800,000	60,117,319	46,514,826	54,919,029	62,866,198	62,769,947	60,903,304	56,686,604
Canada	2,352,000	2,123,520	1,520,736	1,956,080	2,023,952	1,955,408	2,184,000	1,732,416
Great Britain ...	10,192,000	8,722,560	8,692,544	7,960,288	7,544,880	8,049,328	8,652,672	8,279,600
France (b)	7,168,000	5,384,736	3,857,280	1,303,680	3,188,640	5,423,040	4,229,680	3,693,088
Saar	1,232,000	720,720	Included in Germany					
Belgium	4,256,000	3,107,888	2,392,656	803,040	779,520	1,800,960	1,397,760	1,572,480
Luxemburg	2,800,000	2,003,568	1,504,384	350,560	1,485,568	2,499,504	1,304,688	1,480,080
Italy	672,000	425,600	192,864	87,360	336,784	709,744	1,078,112	1,221,472
Spain	560,000	552,160	540,960	516,320	604,800	660,800	604,800	593,600
Sweden	784,000	800,128	750,400	862,400	952,000	884,800	845,600	817,600
Germany (c)	5,040,000	3,221,344	2,707,824	1,237,600	15,835,792	17,602,368	16,897,104	17,017,168
Austria	672,000	306,320	63,840	110,208	1,061,312	1,115,520	907,872	726,432
Czechoslovakia ..	1,792,000	1,568,224	1,058,400	635,040	1,724,800	1,850,352	1,736,896	1,684,032
Poland	1,232,000	959,840	800,800	268,800	1,206,800	1,288,336	1,243,200	1,191,344
Hungary	392,000	329,952	175,840	48,160	230,720	460,096	460,096	487,200
Russia (a)	16,800,000	13,440,000	10,080,000	8,400,000	7,840,000	6,720,000	4,480,000	13,440,000
Japan (d)	784,000	391,216	203,840	1,400,000	6,192,592	6,850,816	7,444,528	7,062,160
India	1,456,000	1,612,800	1,584,912	1,554,000	1,616,384	1,970,752	2,073,008	2,287,264
Australia	1,288,000	1,276,800	978,656	1,298,640	1,462,048	1,611,904	1,296,512	1,721,216
So. Africa.	728,000	698,880	597,184	612,640	519,792	536,704	401,968	346,192
Miscellaneous ...	1,512,000	1,344,000	1,008,000	896,000	784,000	1,008,000	896,000	896,000
World Total	122,512,000	109,107,575	85,225,946	85,219,845	118,256,582	125,768,379	119,037,800	122,935,948

(a) Estimated.

(b) Without Alsace Lorraine from 1940 to 1945

(c) All occupied zones of Germany proper since September 1945, but without Saar from 1947.

(d) Including Korea and Manchuria until July 1945.

FINISHED STEEL DISTRIBUTION
by Market Classifications

(All Grades, Net Tons)

	12 mos., 1948*	12 mos., 1947	12 mos., 1946
bers, Dealers, Distributors	11,299,936	10,484,144	9,304,817
tomotive	10,090,645	9,273,363	6,557,199
istruction, including Maintenance	7,275,573	6,657,205	4,973,111
ntainers	5,312,953	5,076,170	4,255,287
il Transportation	5,227,047	4,879,879	3,806,746
classified	3,905,417	4,660,795	3,549,461
nverters and Processors	3,436,238	2,772,163	1,882,561
port	3,307,142	4,206,692	3,026,771
chinery, Indus. Equip. & Tools.	3,019,925	3,031,719	2,415,517
ntractors' Products	2,451,624	2,243,399	1,618,739
pliances, Utensils and Cutlery ..	2,041,918	1,564,722	1,227,154
mestic & Commercial Equip. other than Appliances, Utensils, Cutlery	1,724,727	1,680,259	1,398,055
ctrical Machinery and Equip. ..	1,599,172	1,595,520	1,154,506
ricultural	1,447,185	1,244,548	1,030,335
lts, Nuts, Rivets, Screws	1,321,630	1,293,027	1,054,717
rgings (other than automotive)..	865,668	741,044	651,706
and Gas Drilling	720,288	930,731	316,366
pbuilding, Marine Equipment...	574,909	337,961	283,803
ning, Quarrying, Lumbering ...	323,799	287,670	209,758
inance, Other Military	102,663	56,908	30,458
craft	33,041	39,231	28,465
Total	66,081,500	63,057,150	48,775,532

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* Estimated by STEEL on basis of actual shipments in first 9 months.

ALLOY STEEL SHIPMENTS
by Market Classifications

(Net Tons)

	8 mos., 1948	12 mos., 1947	12 mos., 1946
nverters and Processors	58,138	73,054	168,763
rgings (other than Automotive) ...	198,805	222,657	182,525
lts, Nuts, Rivets, Screws	35,464	42,340	34,980
bbers, Dealers, Distributors	236,293	222,279	226,419
nstruction, including Maintenance ..	63,627	71,249	46,429
ntractors' Products	44,409	30,629	41,621
tomotive	1,020,384	1,274,054	1,015,821
il Transportation	150,617	227,072	139,601
ipbuilding, Marine Equip.	11,337	11,792	6,997
rcraft	8,135	11,065	11,616
l and Gas Drilling	103,149	156,049	78,611
ning, Quarrying, Lumbering	14,806	19,449	11,073
gricultural	43,573	44,246	27,534
achinery, Indus. Equip. & Tools ...	302,458	445,808	387,520
ectrical Machinery and Equip.	323,217	448,262	357,563
pliances, Utensils, Cutlery	33,638	23,789	34,196
her Domestic & Commercial Equip..	28,403	38,594	38,023
ntainers	18,974	19,741	14,435
dnance, Other Military	1,177	8,811	2,230
nclassified	233,913	589,593	402,837
xport	74,440	175,475	96,328
Total	3,004,957	4,156,008	3,325,122

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STAINLESS STEEL SHIPMENTS
by Market Classifications

(Net Tons)

	8 mos., 1948	12 mos., 1947	12 mos., 1946
nverters and Processors	15,300	15,140	11,519
rgings (other than Automotive)	2,156	4,297	2,012
lts, Nuts, Rivets, Screws	1,782	2,525	1,900
bbers, Dealers, Distributors	48,104	53,364	57,326
nstruction, including Maintenance	2,555	2,648	2,170
ntractors' Products	4,375	4,865	6,486
utomotive	32,039	35,800	33,080
ail Transportation	5,021	4,298	7,460
ipbuilding, Marine Equip.	488	827	587
rcraft	3,794	4,081	2,693
l and Gas Drilling	221	674	217
ining, Quarrying, Lumbering	285	388	364
gricultural	242	224	546
achinery, Indus. Equip. & Tools	16,299	23,901	22,146
ectrical Machinery and Equip.	3,051	5,635	3,902
ppliances, Utensils, Cutlery	28,560	30,658	31,371
ther Domestic & Commercial Equip.	4,965	7,730	12,836
ntainers	4,811	13,159	6,716
rdnance, Other Military	507	84	154
nclassified	26,634	62,775	81,655
xport	8,069	22,473	8,736
Total	209,258	295,546	293,876

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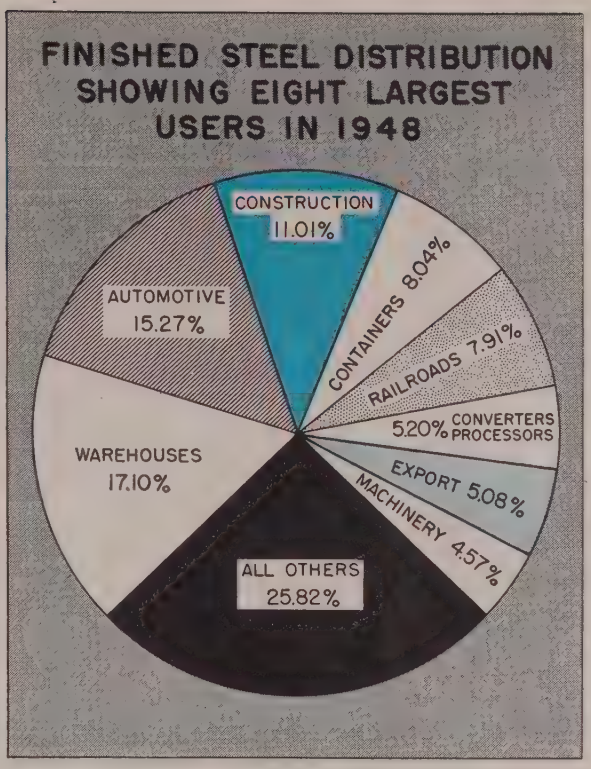

STAINLESS STEEL PRODUCTION

(Ingots—Net Tons)

	18% Cr and 8% Ni	12 to 14% Cr	16 to 18% Cr	All other High Cr or Cr-Ni Alloys	Total
1947.....	313,587	62,190	85,532	58,624	519,933
1946.....	361,207	50,101	77,168	61,621	550,097
1945.....	314,882	67,219	69,593	91,210	542,904
1944.....	299,065	75,065	47,433	55,935	477,498
1943.....	257,010	98,997	21,662	79,779	457,448
1942.....	202,439	62,568	23,211	52,562	340,780
1941.....	163,983	62,993	101,776	43,232	371,984
1940.....	124,817	37,535	65,060	22,568	249,980
1939.....	81,144	22,453	34,230	41,793	179,620
1938.....	43,129	13,429	16,454	22,942	95,954
1937.....	66,212	33,938	27,550	28,918	156,618
1936.....	43,800	26,430	23,842	7,810	101,882
1935.....	27,676	14,820	14,377	16,707	73,580
1934.....	22,150	9,970	9,046	14,741	55,907

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ALLOY STEEL PRODUCTION

(Ingots and Castings—Net Tons)

	Open-hearth Basic	Open-hearth Acid	Open-hearth Total	Bessemer	Crucible	Electric	Total
1948*.	.....	.....	5,298,024	....	†	1,710,317	7,008,341
1947..	5,520,540	128,754	5,649,294	....	†	1,778,937	7,428,231
1946..	4,325,657	115,711	4,441,368	....	†	1,635,827	6,077,195
1945..	5,572,353	274,889	5,847,242	....	18	2,800,451	8,647,711
1944..	6,494,627	515,662	7,010,289	....	23	3,622,774	10,633,086
1943..	8,539,523	677,416	9,216,939	....	136	3,932,743	13,149,818
1942..	7,524,209	608,867	8,133,076	....	522	3,392,776	11,526,374
1941..	5,306,415	433,240	5,739,655	3,890	933	2,461,651	8,206,129
1940..	3,421,961	252,965	3,674,926	3,990	255	1,286,716	4,965,887
1939..	2,302,273	156,581	2,458,854	3,486	231	749,384	3,211,955
1938..	1,179,031	102,089	1,281,120	13	5	372,372	1,653,510
1937..	2,559,200	164,455	2,723,655	....	270	672,616	3,396,541
1936..	2,508,671	129,658	2,638,329	....	234	591,094	3,229,657
1935..	1,829,566	82,208	1,911,774	....	172	462,071	2,374,017
1934..	1,431,744	38,685	1,470,429	60	115	335,144	1,805,748

* First ten months.

† Included with electric steel.

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Production

ANNUAL STEEL CAPACITY AND PRODUCTION BY PROCESSES

(Ingots and Steel for Castings—Net Tons)

	Open-hearth		Bessemer		Crucible		Electric		Total		Per Cent of Capacity	
	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production		
1948....	83,610,690	79,300,000*	5,226,000	4,300,000*	20	‡	5,396,750	4,900,000*	94,233,460	88,500,000*	93.9*	1948
1947....	81,010,990	76,873,793	5,154,000	4,232,543	20	‡	5,076,240	3,787,735	91,241,250	84,894,071	93.0	1947
1946....	81,236,250	60,711,963	5,154,000	3,327,737	20	‡	5,500,290	2,563,024	91,890,560	66,602,724	72.5	1946
1945....	84,171,590	71,939,602	5,874,000	4,305,318	3,800	24	5,455,890	3,456,704	95,505,280	79,701,648	83.5	1945
1944....	82,223,610	80,363,953	6,074,000	5,039,923	3,800	25	5,350,880	4,237,699	93,652,290	89,641,600	95.5	1944
1943....	79,180,880	78,621,804	6,553,000	5,625,492	3,800	146	4,554,980	4,589,070	90,292,660	88,836,512	98.1	1943
1942....	78,107,260	76,501,957	6,721,400	5,553,424	3,800	2,010	3,737,510	3,974,540	88,569,970	86,031,931	96.8	1942
1941....	74,565,510	74,389,619	6,996,520	5,578,071	3,942	2,313	2,586,320	2,869,256	84,152,292	82,839,259	97.3	1941
1940....	73,721,592	61,573,083	6,009,920	3,708,573	5,354	1,024	1,882,630	1,700,006	81,619,496	66,982,686	82.1	1940
1939....	72,959,638	48,409,800	7,138,880	3,358,916	5,354	931	1,725,086	1,029,067	81,828,958	52,798,714	64.5	1939
1938....	71,472,370	29,080,016	7,212,800	2,106,340	9,610	7	1,490,858	565,627	80,185,638	31,751,990	39.6	1938
1937....	69,725,736	51,824,979	7,084,000	3,863,918	11,850	1,046	1,326,788	947,002	78,148,374	56,636,945	72.5	1937
1936....	68,946,829	48,760,463	8,058,400	3,873,472	11,850	914	1,147,221	865,150	78,164,300	53,499,999	68.4	1936
1935....	68,544,310	34,401,280	8,842,400	3,175,235	11,850	719	1,053,370	606,471	78,451,930	38,183,705	48.7	1935
1934....	68,222,445	26,354,838	8,842,400	2,421,840	18,704	595	1,044,867	404,651	78,128,416	29,181,924	37.4	1934
1933....	68,241,286	22,827,473	8,872,668	2,720,246	23,684	763	1,476,765	471,747	78,614,403	26,020,229	33.1	1933
1932....	68,176,102	13,336,210	9,072,420	1,715,925	24,725	722	1,507,666	270,044	78,780,913	15,322,901	19.5	1932
1931....	66,642,430	25,210,714	9,080,820	3,386,259	30,891	1,733	1,503,662	460,255	77,257,803	29,058,961	37.6	1931
1930....	61,884,894	39,255,073	9,608,407	5,639,714	33,523	2,523	1,458,582	686,111	72,985,406	45,583,421	62.5	1930

* Estimated by STEEL. ‡ Included with electric steel. American Iron & Steel Institute.

PRODUCTION OF STEEL INGOTS AND STEEL FOR CASTINGS

	Open-hearth Net tons	Open-hearth Per cent of capac.	Bessemer Net tons	Bessemer Per cent of capac.	Electric Net tons	Electric Per cent of capac.	Total Net tons	Total Per cent of capac.	Calculated weekly production Net tons	Number weeks in mo.
1948										
Jan. ..	6,768,497	95.5	343,169	77.5	361,110	79.0	7,472,776	93.6	1,686,857	4.43
Feb. ..	6,245,338	94.3	340,596	82.3	354,270	82.9	6,940,204	93.0	1,676,378	4.14
Mar. .	6,841,578	96.6	363,235	82.0	403,322	88.2	7,608,135	95.3	1,717,412	4.43
Apr. ..	5,640,168	82.2	185,089	43.2	392,900	88.7	6,218,157	80.4	1,449,454	4.29
May ..	6,799,289	96.0	355,562	80.3	416,801	91.1	7,571,652	94.8	1,709,177	4.43
June ..	6,481,879	94.5	356,810	83.2	417,665	94.3	7,256,354	93.8	1,691,458	4.29
July ..	6,346,423	89.8	324,991	73.6	395,610	86.7	7,067,024	88.7	1,598,874	4.42
Aug. ..	6,631,157	93.6	371,205	83.8	435,246	95.2	7,437,608	93.1	1,678,918	4.43
Sept. .	6,592,226	96.3	387,153	90.5	436,231	98.7	7,415,610	96.1	1,732,619	4.28
Oct. ..	7,118,299	100.5	409,545	92.5	459,268	100.4	7,987,112	100.0	1,802,960	4.43
Nov. ..	6,910,184	100.7	411,049	95.9	441,983	99.8	7,763,216	100.4	1,809,607	4.29
11 mos..	72,375,038	94.6	3,848,404	80.4	4,514,406	91.4	80,737,848	93.6	1,686,958	47.86
1947										
Jan. ..	6,550,058	95.2	384,096	87.7	288,458	66.9	7,222,612	93.2	1,630,386	4.43
Feb. ..	5,835,018	93.9	314,912	79.6	280,471	72.0	6,430,401	91.9	1,607,600	4.00
Mar. .	6,619,641	96.2	378,893	86.5	318,440	73.8	7,316,974	94.4	1,651,687	4.43
Apr. ..	6,365,670	95.5	375,675	88.6	310,497	74.3	7,051,842	93.9	1,643,786	4.29
May ..	6,640,004	96.5	372,878	85.2	326,132	75.6	7,339,014	94.7	1,656,662	4.43
June ..	6,317,705	94.8	351,247	82.8	308,762	73.9	6,977,714	92.9	1,626,507	4.29
July ..	6,033,512	87.9	256,125	58.6	289,048	67.2	6,578,685	85.1	1,488,390	4.42
Aug. .	6,329,497	92.0	346,033	79.0	315,622	73.2	6,991,152	90.2	1,578,138	4.43
Sept. .	6,152,348	92.5	334,425	79.0	310,684	74.6	6,797,457	90.8	1,588,191	4.28
Oct. ..	6,831,984	99.3	384,272	87.8	353,896	82.1	7,570,152	97.7	1,708,838	4.43
Nov. .	6,543,390	98.2	360,620	85.0	338,417	81.0	7,242,427	96.5	1,688,211	4.29
Dec. ..	6,654,966	96.9	373,367	85.5	347,308	80.7	7,375,641	95.4	1,668,697	4.42
12 mos..	76,873,793	94.9	4,232,543	82.1	3,787,735	74.6	84,894,071	93.0	1,628,195	52.14

U. S. PIG IRON PRODUCTION, CAPACITY—Net Tons

1948—(Capacity, 67,438,930)

1948	Production	Per Cent Capacity
Jan.	5,193,935	90.9
Feb.	4,838,032	90.6
Mar.	5,019,687	87.8
Apr.	3,840,398	69.4
May	5,077,168	88.8
June	4,990,501	90.2
July	4,899,929	85.9
Aug.	5,254,612	92.0
Sept.	5,207,533	94.3
Oct.	5,520,394	96.6
Nov.	.....	...
Dec.	.....	...

* Estimated by STEEL
American Iron & Steel Institute

Yearly Totals	Capacity	Production	Per Cent Capacity
1948*.....	67,438,930	60,800,000	90.1
1947.....	65,709,200	59,314,348	90.3
1946.....	67,340,590	45,547,907	67.6
1945.....	67,313,890	54,166,482	80.5
1944.....	67,921,410	62,072,683	91.4
1943.....	64,188,220	61,920,314	96.5
1942.....	60,606,850	60,115,387	99.2
1941.....	57,774,640	56,070,506	97.1
1940.....	55,723,640	46,979,091	84.3
1939.....	56,325,830	35,396,478	62.8
1938.....	56,782,208	21,182,569	37.3
1937.....	55,557,305	41,171,187	74.1
1936.....	55,854,280	34,476,170	61.7
1935.....	57,097,870	23,703,915	41.5
1934.....	57,243,268	17,927,789	31.3

BITUMINOUS COAL OUTPUT

(Millions of Tons)

1948—By Weeks

Jan. 3	11.3	May 1	13.9
Jan.10	13.8	May 8	12.7
Jan.17	13.1	May 15	13.3
Jan.24	12.2	May 22	13.7
Jan.31	11.2	May 29	13.7
Feb. 7	11.4	June 5	13.0
Feb.14	11.2	June 12	13.4
Feb.21	12.9	June 19	13.4
Feb.28	12.9	June 26	12.8
Mar. 6	13.0	July 3	3.7
Mar.13	13.3	July 10	9.8
Mar.20	4.4	July 17	12.2
Mar.27	2.1	July 24	12.3
Apr. 3	2.1	July 31	12.5
Apr.10	2.4	Aug. 7	12.1
Apr.17	7.7	Aug.14	12.5
Apr.24	11.6	Aug.21	12.3
		Aug.28	12.2
Sept. 4	12.0		
Sept.11	10.8		
Sept.18	11.8		
Sept.25	11.8		
Oct. 2	11.6		
Oct. 9	11.9		
Oct. 16	12.0		
Oct. 23	12.0		
Oct. 30	12.3		
Nov. 6	10.2		
Nov. 13	12.1		
Nov. 20	12.1		
Nov. 27	10.1		
Dec. 4	11.4		
Dec. 11	11.9		
Dec. 18	.....		
Dec. 25	.....		

Total Yearly Production in Tons

1947	630,623,722	1942	582,692,937
1946	533,922,000	1941	514,149,245
1945	577,617,327	1940	460,771,500
1944	619,576,240	1939	394,855,325
1943	590,177,069	1938	348,544,764

U. S. Bureau of Mines

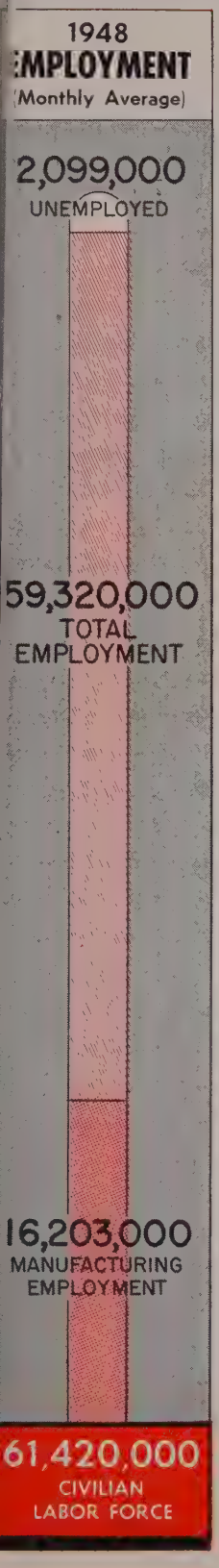
COKE

Production—Net Tons

1948	Oven	Beehive	Total
Jan.	5,864,906	606,181	6,471,087
Feb.	5,512,838	539,279	6,052,117
Mar.	5,652,540	324,208	5,976,748
Apr.	4,490,766	246,146	4,736,912
May	5,721,600	577,319	6,298,919
June	5,592,763	540,036	6,132,799
July	5,712,851	435,117	6,147,968
Aug.	5,842,523	612,194	6,454,717
Sept.	5,762,700	588,487	6,351,187
Oct.	5,965,649	618,348	6,583,997
Nov.	.....	.....	.....
Dec.	.....	.....	.....

Yearly Totals	Oven	Beehive	Total
1948*	56,119,136	5,093,116	61,212,252
1947	66,380,173	6,566,499	72,946,672
1946	53,929,447	4,568,401	58,497,848
1945	62,094,288	5,213,893	67,308,181
1944	67,064,795	6,973,022	74,037,817
1943	63,742,676	7,933,387	71,676,063
1942	62,294,909	8,274,035	70,568,944
1941	58,482,422	6,704,156	65,186,578
1940	54,014,309	3,057,825	57,072,134
1939	42,882,313	1,444,328	44,326,641

* Ten months.
U. S. Bureau of Mines



EMPLOYMENT

(In Thousands)

1948	Civilian Labor Force	Total Employment	Unemployment	Mfg. Employment
Jan.	59,214	57,149	2,065	16,267
Feb.	59,778	57,139	2,639	16,183
Mar.	59,769	57,329	2,440	16,269
Apr.	60,524	58,330	2,193	15,950
May	60,422	58,660	1,761	15,892
June	63,479	61,296	2,184	16,113
July	63,842	61,615	2,227	16,155
Aug.	63,186	61,245	1,941	16,451
Sept.	62,212	60,312	1,899	16,638
Oct.	61,776	60,134	1,642	.....
1947				
Jan.	57,790	55,390	2,400	15,372
Feb.	58,010	55,520	2,490	15,475
Mar.	58,390	56,060	2,330	15,510
Apr.	59,120	56,700	2,420	15,429
May	60,290	58,330	1,960	15,237
June	62,609	60,055	2,555	15,328
July	62,664	60,079	2,584	15,233
Aug.	61,665	59,569	2,096	15,962
Sept.	60,784	58,872	1,912	16,175
Oct.	60,892	59,204	1,687	16,209
Nov.	60,216	58,595	1,621	16,256
Dec.	59,590	57,947	1,643	16,354
1946				
Jan.	53,320	51,020	2,300	13,499
Feb.	53,890	51,240	2,650	12,751
Mar.	55,160	52,460	2,700	13,433
Apr.	56,450	54,120	2,330	14,045
May	57,160	54,850	2,310	14,159
June	58,930	56,360	2,570	14,371
July	60,110	57,840	2,270	14,526
Aug.	59,750	57,690	2,060	14,876
Sept.	59,120	57,050	2,070	15,035
Oct.	58,990	57,030	1,960	15,064
Nov.	58,970	57,040	1,930	15,271
Dec.	58,430	56,310	2,120	15,348

STEEL COMMON LABOR RATES

	Hourly wage	Per cent over 1915
1915	20.0	...
February 1, 1916	22.0	10.0
May 1, 1916	25.0	25.0
December 15, 1916	27.5	37.5
May 1, 1917	30.0	50.0
October 1, 1917	33.0	65.0
April 16, 1918	38.0	90.0
August 1, 1918	42.0	110.0
October 1, 1918	46.2	131.0
February 1, 1920	50.6	153.0
May 16, 1921	40.5	102.5
July 16, 1921	37.0	85.0
August 29, 1921	30.0	50.0
September 1, 1922	36.0	80.0
April 16, 1923	40.0	100.0
August, 1923	44.0	120.0
October 1, 1931	39.6	98.0
May 16, 1932	33.7	68.5
August 19, 1933 (NRA)	40.0	100.0
April 1, 1934	44.0	120.0
November, 1936	52.5	162.0
March, 1937	62.5	212.5
April, 1941	72.5	262.5
July, 1942	78.0	290.0
February, 1946	96.5	392.5
April, 1947	109.0	445.0
July 16, 1948	118.5	492.5

STEEL EMPLOYMENT, WAGES, HOURS, PAYROLLS

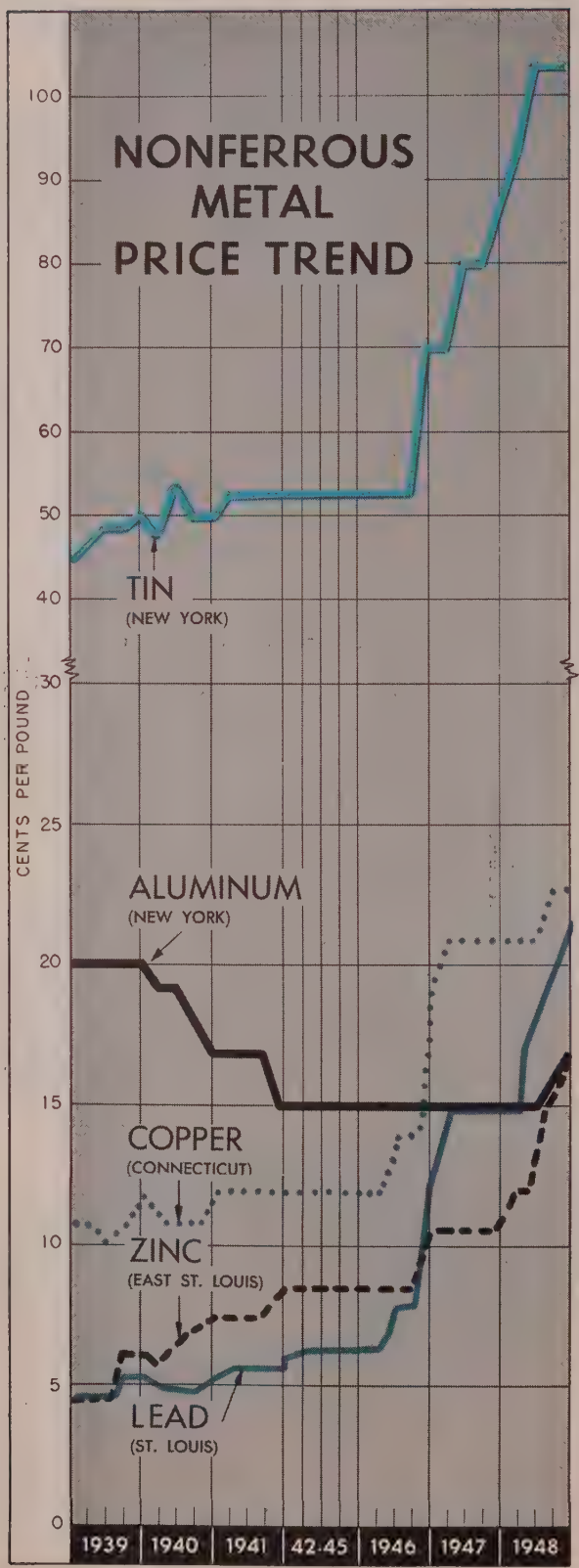
1948	Number Employees	Average Hourly Earnings	Average Hours per week	Total Payrolls
Jan.	622,000	$1.573	39.6	$180,253,000
Feb.	626,200	1.551	39.1	167,600,000
Mar.	628,800	1.548	40.6	183,045,000
Apr.	626,200	1.551	38.0	168,500,000
May	627,600	1.577	38.0	175,300,000
June	633,600	1.569	39.9	179,483,000
July	641,000	1.645	36.4	179,846,000
Aug.	644,500	1.689	38.1	193,800,000
Sept.	641,000	1.718	40.1	199,400,000
Oct.	644,100	1.699	39.5	201,668,000
1947				
Jan.	601,200	1.381	40.3	155,778,000
Feb.	606,700	1.370	39.0	139,482,000
Mar.	608,800	1.379	38.2	150,560,000
Apr.	610,700	1.533	40.0	168,266,000
May	614,800	1.556	39.1	175,793,000
June	622,600	1.547	38.1	167,625,000
July	623,000	1.539	35.9	163,200,000
Aug.	625,000	1.556	37.1	169,100,000
Sept.	618,000	1.571	38.3	168,900,000
Oct.	620,000	1.546	40.6	180,100,000
Nov.	624,000	1.587	38.1	171,000,000
Dec.	620,900	1.565	38.6	175,273,000
Year 1947	616,300	1.513	38.6	1,986,600,000
1946				
Jan.-Feb.	522,300	1.314	24.0	169,890,500
Mar.	570,500	1.351	37.9	138,756,000
Apr.	581,800	1.341	37.2	134,347,800
May	562,900	1.358	32.6	121,422,200
June	578,000	1.344	34.6	125,589,900
July	585,100	1.351	36.9	137,988,000
Aug.	595,600	1.346	38.5	145,226,300
Sept.	595,700	1.362	37.5	139,625,000
Oct.	595,700	1.341	40.3	150,637,500
Nov.	600,000	1.367	38.0	143,440,700
Dec.	594,200	1.352	35.7	137,216,500
Year 1946	575,300	1.347	35.1	1,544,142,000
Yearly Totals				
1947	616,300	1.513	38.6	1,986,600,000
1946	575,300	1.347	35.1	1,544,142,000
1945	551,200	1.248	44.2	1,645,332,700
1944	571,200	1.219	46.7	1,745,019,700
1943	625,700	1.135	43.0	1,649,227,000
1942	647,200	1.056	38.9	1,467,058,700
1941	633,000	.959	38.6	1,301,347,800
1940	546,800	.850	36.2	960,779,300
1939	482,585	.840	34.8	812,775,082
1938	442,739	.830	27.6	613,198,987
1937	572,244	.818	36.8	976,083,169
1936	499,704	.668	39.8	758,059,542
1935	425,941	.655	34.2	557,793,724
1934	409,349	.628	29.5	457,842,517

American Iron & Steel Institute

AVERAGE EARNINGS IN MANUFACTURING INDUSTRIES

Year	25 Mfg. Industries: Average Hourly Earnings	25 Mfg. Industries: Average Weekly Earnings	25 Mfg. Industries: Hours Worked Per Week	Average Hourly Earnings: Farm Implements	Automobile	Electrical	Iron & Steel	Foundries	Machines & Machine Tools	Hardware, Small Parts
1948, Jan.	$1.406	$57.35	$40.9	$1.447	$1.576	$1.433	$1.573	$1.437	$1.405	$1.343
Feb.	1.412	57.27	40.6	1.457	1.567	1.430	1.551	1.438	1.407	1.344
Mar.	1.417	57.67	40.7	1.461	1.558	1.432	1.548	1.440	1.409	1.363
Apr.	1.423	57.10	40.2	1.460	1.558	1.433	1.551	1.439	1.416	1.372
May	1.433	56.88	39.7	1.469	1.571	1.436	1.577	1.443	1.422	1.375
June	1.451	57.95	40.0	1.488	1.644	1.463	1.569	1.462	1.461	1.372
July	1.474	58.44	39.7	1.523	1.665	1.495	1.645	1.494	1.473	1.400
1947	1.406	57.35	40.9	1.387	1.490	1.366	1.510	1.369	1.354	1.293
1946	1.190	47.55	40.1	1.234	1.367	1.237	1.348	1.231	1.243	1.186
1945	1.097	48.46	44.2	1.154	1.277	1.151	1.246	1.144	1.177	1.124
1944	1.067	48.83	45.6	1.137	1.312	1.132	1.183	1.138	1.148	1.103
1943	1.014	45.88	45.0	1.089	1.295	1.067	1.135	1.067	1.080	1.048
1942	0.924	40.03	43.0	1.004	1.248	1.012	1.037	0.965	1.010	0.920
1941	0.814	33.62	41.2	0.905	1.086	0.904	0.957	0.834	0.854	0.792
1940	0.739	28.54	38.6	0.818	0.971	0.814	0.850	0.762	0.776	0.700
1939	0.720	27.04	37.6	0.805	0.953	0.796	0.841	0.749	0.751	0.670
1938	0.716	24.43	34.3	0.800	0.953	0.801	0.830	0.738	0.735	0.658
1937	0.695	26.80	38.7	0.777	0.916	0.756	0.818	0.703	0.714	0.638
1936	0.619	24.39	39.5	0.675	0.791	0.669	0.670	0.612	0.646	0.557
1935	0.599	22.23	37.2	0.666	0.752	0.667	0.655	0.602	0.637	0.545
1934	0.580	20.06	34.7	0.609	0.713	0.648	0.628	0.580	0.619	0.531

Prices



FINISHED STEEL ANNUAL PRICE AVERAGES

(Per net ton, Pittsburgh)

	Sheets			Strip		Tin
	H.R.	C.R.	Gal.	H.R.	C.R.	Plate
1948	$60.17	$74.83	$82.80	$62.40	$80.36	$135.75
1947	52.60	67.03	74.05	52.60	67.03	116.00
1946	48.03	64.80	79.50	47.33	60.56	104.38
1945	43.92	61.00	73.50	42.00	56.00	100.00
1944	42.00	61.00	70.00	42.00	56.00	100.00
1943	42.00	61.00	70.00	42.00	56.00	100.00
1942	42.00	61.00	70.00	42.00	56.00	100.00
1941	42.00	61.00	70.00	42.00	56.00	100.00
1940	41.80	60.80	70.00	41.75	55.75	100.00
1939	41.25	62.08	70.00	41.25	57.08	100.00
1938	45.42	66.67	72.92	45.25	61.08	106.00
1937	47.08	69.92	74.50	47.08	62.75	104.33
1936	38.25	60.00	63.25	38.25	52.33	105.00
1935	37.00	59.00	62.00	37.00	52.00	105.00
1934	37.08	58.75	61.25	37.17	51.75	105.00
1933	33.17	51.83	54.92	31.83	42.17	88.67
1932	34.08	55.17	56.33	28.92	39.75	93.75
1931	37.25	62.83	57.58	30.58	43.33	98.75
1930	40.17	73.00	63.00	33.67	49.33	103.75
1929	43.33	81.58	71.33	37.75	55.33	107.00
1928	40.75	80.67	71.75	36.92	56.83	105.25
1927	44.08	83.83	75.17	41.67	61.25	108.83

	Bars				Basic	Standard
	H.R.	C.F.	Plates	Shapes	Wire	Nails
1948	$62.84	$75.63	$63.84	$60.17	$80.10	$107.33
1947	54.60	67.03	55.53	52.53	70.67	84.44
1946	49.46	61.21	49.38	46.38	60.25	69.61
1945	44.25	53.83	44.50	42.00	53.83	57.08
1944	43.00	53.00	42.00	42.00	52.00	51.00
1943	43.00	53.00	42.00	42.00	52.00	51.00
1942	43.00	53.00	42.00	42.00	52.00	51.00
1941	43.00	53.00	42.00	42.00	52.00	51.00
1940	43.00	53.00	42.00	42.00	52.00	51.00
1939	43.75	53.33	42.00	42.00	52.00	49.17
1938	47.00	56.00	43.50	43.50	55.00	52.00
1937	48.08	56.75	44.25	44.25	56.92	53.25
1936	38.50	44.42	37.00	37.00	48.17	42.83
1935	36.33	40.00	36.00	36.00	46.00	50.58
1934	36.17	42.00	35.67	35.67	45.42	50.58
1933	32.75	36.08	32.17	32.50	42.25	39.92
1932	31.67	35.75	31.67	31.67	44.00	39.00
1931	32.50	41.67	32.33	32.08	44.00	37.75
1930	34.42	41.83	34.17	34.17	46.67	42.50
1929	38.50	45.25	38.56	38.58	49.42	51.58
1928	37.50	44.00	37.50	37.50	49.00	51.58
1927	36.75	45.67	36.42	36.67	48.25	51.00

FINISHED STEEL WEIGHTED PRICE COMPOSITE

(In cents per pound, weighted on basis of actual monthly shipments of following 19 products representing about 82 per cent of total steel shipments as reported by American Iron & Steel Institute: Heavy structural shapes; plates; standard rails; hot-rolled carbon bars; cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip.)

	1948	1947	1946	1945	1944
Jan.	3.49997	3.07518	2.68244†	2.52622	2.41455
Feb.	3.54374	3.09137	2.77932†	2.53328	2.38787
Mar.	3.63079	3.10998	2.87746	2.56960	2.42750
Apr.	3.62766	3.12077	2.90762	2.58675	2.43493
May	3.58321	3.11584	2.95661	2.57560	2.44428
June	3.57740	3.12729	2.93140	2.63388	2.46683
July	4.06995	3.20098	2.88893	2.62278	2.45656
Aug.	4.14340	3.46652	2.89610	2.64085	2.46272
Sept.	4.13446	3.45716	2.87866	2.60738	2.44551
Oct.	4.16150	3.45536	2.86140	2.61832	2.44848
Nov.	.....	3.47537	2.87671	2.61465	2.45888
Dec.	.....	3.49055	2.91932	2.61277	2.48509

† Determined on basis of aggregate steel product tonnage shipped in both strike-affected months.

LAKE SUPERIOR IRON ORE PRICES

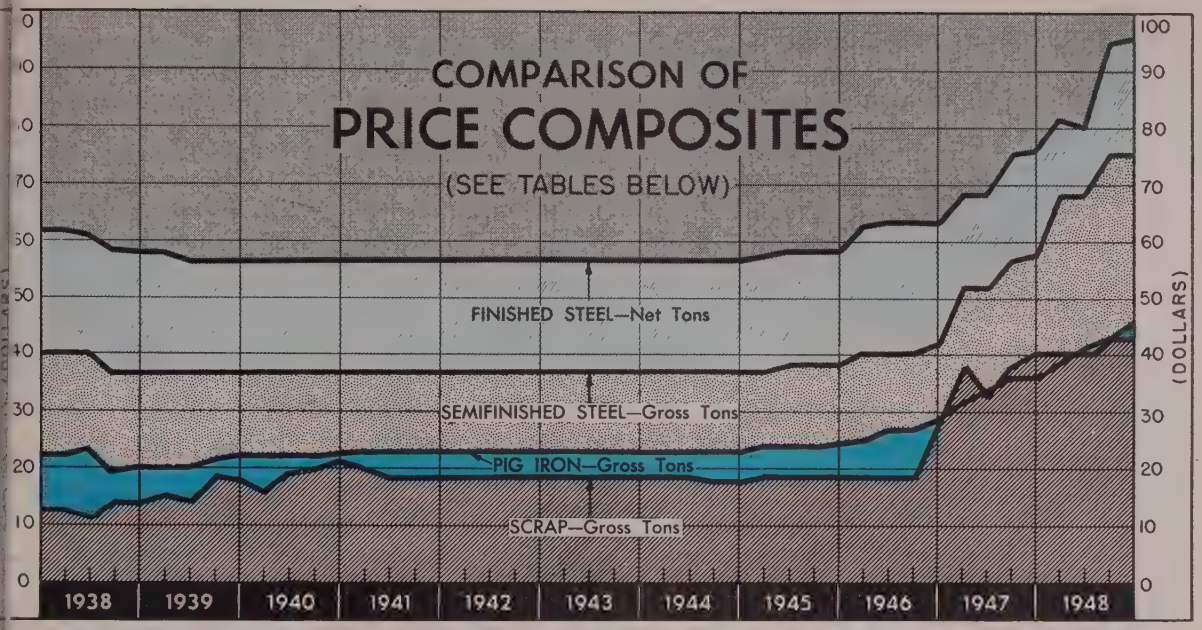
(Per gross ton; 51½% iron)

	1948	1947	1946	1945	1944
Bessemer Old Range	$6.60	$5.95	$5.45	$4.95	$4.75
Bessemer Mesabi	6.35	5.70	5.20	4.70	4.60
Nonbessemer Old Range	6.45	5.80	5.30	4.80	4.60
Nonbessemer Mesabi	6.20	5.55	5.05	4.55	4.45
High Phosphorus	6.20	5.55	5.05	4.55	4.35

METALLURGICAL COKE PRICES

(Per net ton)

	1948	1947	1946	1945	1944
Connellsville, furnace	$13.55	$10.51	$8.13	$7.29	$7.00
Connellsville, foundry	15.95	12.27	8.88	8.04	7.75
New River, foundry	14.98	12.27	9.54	8.92	8.63
Wise county, foundry	13.75	10.87	8.42	7.79	7.50
Wise county, furnace	13.07	10.38	7.92	7.29	7.00



FINISHED STEEL—ARITHMETICAL PRICE COMPOSITE

dollars per net ton, computed from industry-wide prices on carbon steel: Hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, tes, structural shapes, basic wire, standard nails, tin plate, and standard and line pipe. Based on basing point prices through June, 1948; mill prices for subsequent months.)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
8	$78.26	$79.86	$81.14	$81.14	$80.27	$80.27	$86.18	$95.05	$95.05	$95.05	$95.16	$95.50	$86.91
7	69.59	69.82	69.82	69.82	69.82	69.82	70.80	75.41	75.41	75.41	76.09	76.15	72.33
6	58.27	60.91	63.54	63.54	63.54	64.09	64.45	64.45	64.45	64.45	64.45	64.75	63.41
5	57.35	57.55	57.55	57.55	57.73	58.27	58.27	58.27	58.27	58.27	58.27	58.27	57.97
4	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
3	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
2	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
1	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73
0	56.73	56.73	56.73	56.08	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.73	56.68
9	57.36	57.36	57.36	57.36	56.74	56.36	56.29	56.27	56.27	56.49	56.54	56.73	56.76
8	62.18	62.05	62.00	62.00	62.00	61.45	58.00	58.00	58.00	57.78	57.52	57.36	59.86

SEMIFINISHED STEEL PRICE COMPOSITE

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
48	$60.46	$67.16	$68.72	$68.72	$68.62	$68.62	$71.47	$75.75	$75.75	$75.75	$75.75	$75.75	$71.04
47	49.98	52.10	52.10	52.10	52.10	52.10	53.04	56.80	56.80	56.80	57.20	57.20	54.03
46	37.80	39.20	40.60	40.60	40.60	40.60	40.60	40.60	40.60	40.60	40.60	41.10	40.29
45	36.00	36.00	36.00	36.00	36.45	37.80	37.80	37.80	37.80	37.80	37.80	37.80	37.09
44	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
43	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
42	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
41	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
40	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
39	36.60	36.60	36.60	36.60	36.60	36.60	36.60	36.60	36.60	36.60	36.60	36.15	36.56
38	40.00	40.00	40.00	40.00	40.00	40.00	36.60	36.60	36.60	36.60	36.60	36.60	38.30

Average of industry-wide prices (per gross ton) on billets, slabs, sheet bars, skelp and wire rods.

STEELMAKING SCRAP PRICE COMPOSITE

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
48	$40.75	$40.48	$40.21	$40.41	$40.67	$40.67	$41.43	$43.33	$43.33	$43.25	$43.25	$43.25	$41.75
47	31.20	33.50	37.25	33.94	29.75	32.48	37.23	39.00	37.83	39.85	40.42	40.13	36.05
46	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	22.22	27.69	20.13
45	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
44	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	18.00	16.50	16.40	18.54	18.95
43	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
42	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17
41	21.00	20.05	20.15	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.50
40	17.60	17.10	16.55	16.19	17.30	19.15	18.65	18.80	20.20	20.70	20.80	21.40	18.70
39	14.90	14.95	15.15	14.80	14.10	14.60	14.90	15.35	18.15	21.55	20.15	17.95	16.40
38	14.10	13.70	13.40	12.60	11.60	11.10	13.30	14.55	14.35	14.15	14.70	14.90	13.55

Average of No. 1 heavy melting steel scrap prices (per gross ton) at Pittsburgh, Chicago and eastern Pennsylvania.

STEELMAKING PIG IRON PRICE COMPOSITE

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
48	$38.50	$39.30	$39.34	$39.21	$39.66	$40.49	$41.42	$44.12	$44.62	$46.19	$46.29	$46.29	$42.12
47	29.56	29.59	32.40	32.49	32.49	32.49	33.82	36.06	36.14	36.18	36.38	36.31	33.66
46	24.75	24.75	25.13	25.50	25.50	27.50	27.50	27.50	27.50	27.50	27.50	29.10	26.64
45	23.00	23.50	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.19	24.75	24.75	24.01
44	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
43	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
42	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
41	22.80	22.95	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.05	23.02
40	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.05	22.32	22.07
39	20.05	20.05	20.05	20.05	20.05	20.05	20.05	21.05	22.05	22.05	22.05	22.05	20.68
38	22.92	22.92	22.92	23.02	23.05	23.05	19.05	19.05	19.05	20.05	20.05	20.05	21.20

Average of basic pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City, Youngstown.

Average Monthly Quotations in 1948

Finished Steel Prices Are Cents Per Pound and Semifinished, Dollars Per Gross Ton, Unless Otherwise Noted; Coke, Dollars Per Net Ton; Other Products, Dollars Per Gross Ton. All Prices Are Mill or Furnace, Unless Otherwise Noted.

PITTSBURGH

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Structural Shapes	2.80c	2.80c	2.80c	2.80c	2.775c	2.775c	2.975c	3.275c	3.275c	3.275c	3.275c	3.275c
Plates	2.95	2.95	2.95	2.95	2.925	2.925	3.155	3.50	3.50	3.50	3.50	3.50
Bars, Hot-Rolled	2.90	2.90	2.90	2.90	2.875	2.875	3.105	3.45	3.45	3.45	3.45	3.45
Bars, Cold-Finished	3.55	3.55	3.55	3.55	3.50	3.50	3.68	4.10	4.10	4.10	4.10	4.10
Sheets, Hot-Rolled	2.80	2.80	2.80	2.80	2.775	2.775	2.975	3.275	3.275	3.275	3.275	3.275
Sheets, Cold-Rolled	3.55	3.55	3.55	3.55	3.50	3.50	3.70	4.00	4.00	4.00	4.00	4.00
Sheets, No. 10 Galvanized	3.93	3.95	3.95	3.95	3.90	3.90	4.10	4.40	4.40	4.40	4.40	4.40
Strip, Hot-Rolled	2.80	2.925	3.05	3.05	3.05	3.05	3.140	3.275	3.275	3.275	3.275	3.275
Strip, Cold-Rolled	3.55	3.675	3.80	3.80	3.775	3.775	3.965	4.375	4.375	4.375	4.375	4.375
Standard Spikes	4.85	4.85	4.85	4.85	4.85	4.85	5.01	5.25	5.25	5.25	5.25	5.25
Plain Wire	3.695	3.775	3.775	3.775	3.725	3.725	3.965	4.325	4.325	4.325	4.325	4.325
Wire Nails	4.67	4.95	5.20	5.20	5.125	5.125	5.255	5.775	5.775	5.775	5.775	5.775
Structural Rivets	5.65	5.65	5.65	5.65	5.65	5.65	5.65	6.75	6.75	6.75	6.75	6.75
Tin Plate, 1.50-pound coating (base box)	$6.80	$6.80	$6.80	$6.80	$6.80	$6.70	$6.74	$6.80	$6.80	$6.80	$6.80	$6.80
Pipe, steel, 1-3 inch, % discount from list	57	55¼	53½	53½	53¾	54	51½	49¼	49½	49½	49½	49½
Pig Iron, Bessemer, Neville Island furnace	$39.40	$40.00	$40.00	$40.00	$40.00	$44.08	$43.00	$47.00	$47.00	$47.00	$47.00	$47.00
Pig Iron, Basic, Neville Island furnace	38.40	39.00	39.00	39.00	39.00	42.00	42.00	46.00	46.00	46.00	46.00	46.00
Pig Iron, No. 2 Foundry, Neville Island furnace	38.90	39.50	39.50	39.50	39.50	43.58	42.50	46.50	46.50	46.50	46.50	46.50
Pig Iron, Malleable, Neville Island furnace	38.90	39.50	39.50	39.50	39.50	42.50	42.50	46.50	46.50	46.50	46.50	46.50
Ferrosilicon, Bessemer, 10%, Jackson, O., furnace	56.85	57.25	59.25	59.25	59.25	62.25	63.25	65.50	66.25	68.50	69.25	69.25
Billets, Bessemer and Open-Hearth	$40.18	$42.59	$45.00	$45.00	$45.00	$45.00	$47.80	$59.00	$59.00	$59.00	$59.00	$59.00
Sheet Bars, Bessemer and Open-Hearth	53.57	56.79	60.00	60.00	60.00	60.00	....	....	....	....	....	....
Wire Rods (per 100 lb)	3.10	3.175	3.175	3.175	3.175	3.175	3.415	3.775	3.775	3.775	3.775	3.775
Furnace Coke, spot	12.50	12.50	12.50	12.55	12.94	13.00	14.25	14.375	14.50	14.50	14.50	14.50
Foundry Coke, spot	14.60	14.78	14.875	14.875	15.06	15.219	17.00	17.00	17.00	17.00	17.00	17.00
Steel Scrap, No. 1 Heavy Melting	40.30	40.44	40.25	40.25	40.25	40.25	40.75	42.75	42.75	42.75	42.75	42.75
Scrap, Low Phosphorous	47.15	47.81	47.75	47.75	47.75	48.00	48.20	49.25	49.25	49.75	49.75	49.75
Scrap, No. 1 Cast	56.75	60.00	63.25	65.90	65.25	64.38	63.70	65.00	65.50	65.50	65.50	65.50

CHICAGO

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bars	2.90c	2.90c	2.90c	2.90c	2.875c	2.875c	3.065c	3.35c	3.35c	3.35c	3.35c	3.35c
Sheets, Cold-Rolled	3.55	3.55	3.55	3.55	3.50	3.50	3.70	4.00	4.00	4.00	4.00	4.00
Plates	2.95	2.95	2.95	2.95	2.925	2.925	3.115	3.40	3.40	3.40	3.40	3.40
Structural Shapes	2.80	2.80	2.80	2.80	2.775	2.775	2.965	3.25	3.25	3.25	3.25	3.25
Pig Iron, No. 2 Foundry	$36.60	$39.00	$39.00	$39.00	$39.00	$39.00	$41.10	$43.25	$43.25	$45.13	$46.25	$46.25
Pig Iron, Malleable	39.10	39.50	39.50	39.50	39.50	39.50	41.50	43.50	43.50	45.38	46.50	46.50
Charcoal Iron, Low Phos, f.o.b. Lyles, Tenn.	50.00	55.00	55.00	55.00	56.50	58.00	59.60	62.00	62.00	66.00	66.00	66.00
Scrap, No. 1 Heavy Melting	39.05	39.125	38.875	39.10	39.25	39.25	40.05	41.75	41.75	41.75	41.75	41.75
Rails for Rerolling	60.00	51.00	49.625	49.50	51.75	53.75	57.80	64.25	64.50	65.50	69.50	69.50
Cast Scrap, No. 1 Cupola	63.50	66.00	66.00	68.40	69.00	68.375	68.50	70.75	71.10	70.75	70.50	70.50

EASTERN PENNSYLVANIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tank Plates, del. Philadelphia	3.186c	3.19c	3.19c	3.19c	3.21c	3.21c	3.41c	3.71c	3.71c	3.71c	3.71c	3.71c
Structural Shapes, del. Philadelphia	2.966	2.968	2.968	2.968	2.98	2.98	3.18	3.48	3.48	3.48	3.48	3.48
Bars, Steel, del. Philadelphia	3.348	3.356	3.356	3.356	3.365	3.365	3.545	3.79	3.79	3.79	3.79	3.79
Sheets, Hot-Rolled, del. Philadelphia	3.036	3.04	3.04	3.04	3.06	3.06	3.25	3.51	3.51	3.51	3.51	3.51
Pig Iron, Basic, del. Philadelphia	$41.372	$42.004	$42.004	$42.004	$42.17	$42.17	$43.77	$46.17	$47.77	$50.17	$50.17	$50.17
Pig Iron, No. 2 Foundry, del. Philadelphia	41.871	42.504	42.504	42.504	42.67	42.67	44.27	46.67	48.27	50.67	50.67	50.67
Pig Iron, Standard Low Phosphorus, delivered	47.749	48.592	48.592	48.592	48.81	48.81	50.41	52.81	54.41	56.81	56.81	56.81
Spiegeleisen, 19-21%, Palmerton, Pa., furnace	47.00	47.00	48.25	52.00	52.00	52.00	52.00	52.00	57.00	57.00	57.00	57.00
Steel Scrap, No. 1 Heavy Melting	43.60	41.875	41.50	41.75	42.50	42.50	43.30	45.50	45.45	45.25	45.25	45.25
Cast Iron Scrap, No. 1 Cupola	55.40	62.75	64.25	63.30	64.00	64.00	64.00	64.00	64.00	64.00	64.00	64.00

COAL CHEMICALS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol, per gallon, producers' plants, tank lots	20.00c	21.00c	21.00c	21.00c	21.00c	21.00c	21.00c	20.12c	20.00c	20.00c	20.00c	20.00c
Toluol, two degree, per gallon, delivered, tank lots	26.46	28.00	28.00	28.00	28.00	28.00	25.13	24.75	24.75	24.75	24.75	24.75
Xylol, per gallon, delivered, tank lots	27.08	28.00	28.00	28.00	28.00	28.00	24.02	23.50	23.50	23.50	23.50	23.50
Naphthalene, flakes and balls, per pound, producers' plants, barrels to jobbers	11.00	11.00	11.00	11.00	11.73	12.00	12.00	12.00	12.00	12.40	13.75	13.75
Phenol, per pound, producers' plants, less than carlots	13.10	13.25	13.25	13.25	13.62	13.75	13.75	13,75	13.75	13.75	14.25	14.25
Sulphate of Ammonia, per ton, bulk, f.o.b. Atlantic Seaboard	$38.46	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$43.65	$45.00	$45.00	$45.00	$45.00

NONFERROUS METALS

Prompt wholesale prices in cents per pound

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00	103.00	103.00	103.00	103.00	103.00	103.00	103.00
Copper, Electrolytic, delivered Connecticut	21.50	21.50	21.50	21.50	21.50	21.50	21.574	23.23	23.50	23.50	23.50	23.50
Zinc, Prime Western, East St. Louis	11.056	12.00	12.00	12.00	12.00	12.00	12.444	15.00	15.00	15.173	16.58	17.50
Lead, open market, St. Louis	14.825	14.825	14.825	17.037	17.325	17.325	17.621	19.325	19.325	19.325	21.325	21.325
Aluminum, ingots, 99 per cent plus, del.	15.00	15.00	15.00	15.00	15.00	15.058	15.500	16.269	16.50	16.846	17.00	17.00
Antimony, domestic, bulk, c.l., f.o.b. Laredo, Tex.	33.00	33.00	33.00	33.00	33.70	35.00	35.00	35.00	35.00	37.423	38.50	38.50
Nickel, electrolytic cathodes, 99.9%, base sizes, unpacked, f.o.b. refinery	33.75	33.75	33.75	33.75	33.75	33.75	35.833	40.00	40.00	40.00	40.00	40.00
Silver, open market, New York	74.625	74.625	74.625	74.625	74.625	74.625	74.625	73.79	75.284	77.226	73.655	73.655

For

DANGEROUS FUME REMOVAL--

BIFURCATOR ROOF VENTILATORS (EXHAUST)

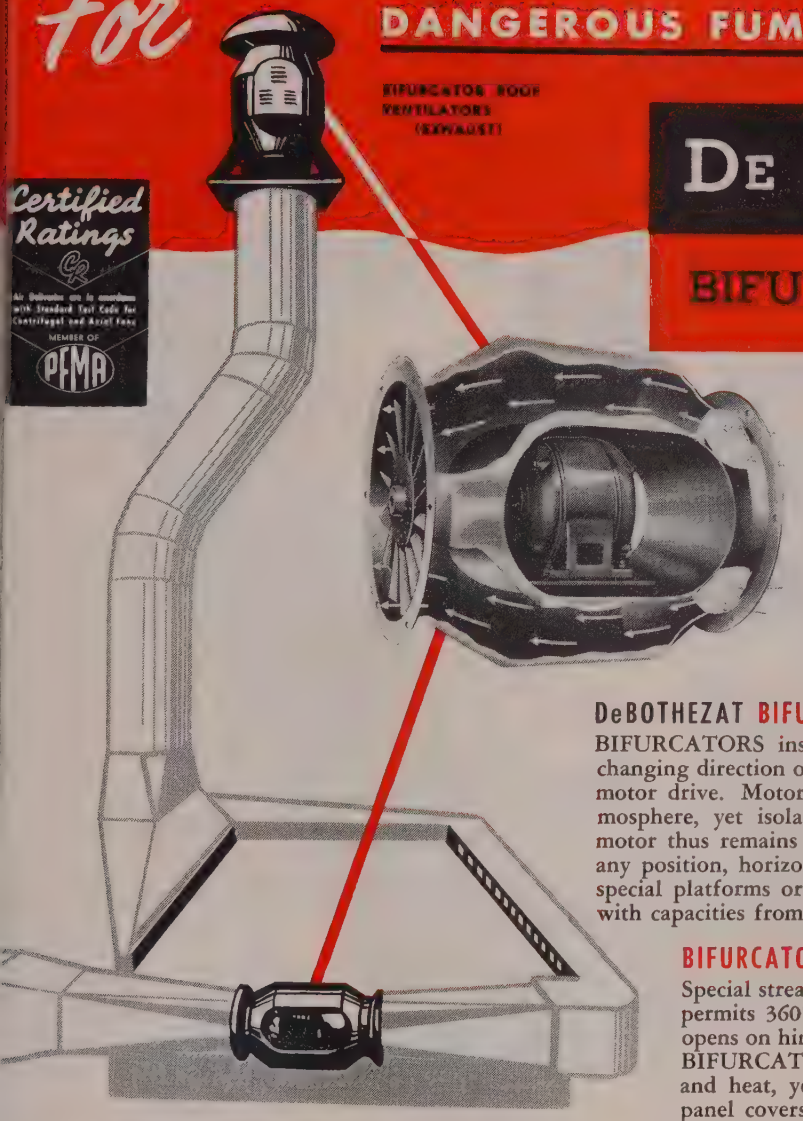
Certified Ratings

Air Deliveries are in accordance with Standard Test Code for Centrifugal and Axial Fans

MEMBER OF PFMA

DE BOTHEZAT

BIFURCATOR FANS



BIFURCATOR FOR INTAKE

LATERAL TANK VENTILATION REMOVES FUMES WITH LESS HEAT LOSS

The accompanying sketch is one of several tested designs in DeBothezat's data booklet on lateral tank ventilation dealing with acid fume removal. In this case, two bifurcators are used in "push-pull" arrangement — one laterally, for intake; and one BIFURCATOR Roof Ventilator for exhaust. *No other type or make of ventilator is so well adapted to this and other methods of exhausting dangerous fumes.*

DeBOTHEZAT BIFURCATOR FANS

BIFURCATORS install as an integral part of the duct without changing direction of air flow or size of main line. Fan has a direct motor drive. Motor is mounted in separate chamber, open to atmosphere, yet isolated from destructive fumes handled by fan; motor thus remains cool, clean and easily accessible. Mounted in any position, horizontal, vertical or at any angle, they require no special platforms or supports. Available in a wide range of sizes with capacities from 1090 to 43,200 cu. ft. of air per minute.

BIFURCATOR ROOF VENTILATOR

Special streamlined head protects fan from weather. Design permits 360° diffusion with minimum friction loss. Head opens on hinges for easy fan inspection. As in the standard BIFURCATOR, motor is protected from exhaust fumes and heat, yet easily accessible for maintenance. Louvred panel covers motor chamber.

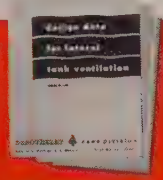
NOTE: BIFURCATORS may be had with special corrosion and heat-resisting housings for extreme applications.

DE BOTHEZAT

"HY-V" AIR JET

educe fatigue of workmen exposed to ntense heat with "Hy-V" Air Jets. Whether mounted on the wall or on heeled stand, the "Hy-V" concentrates a blast of cooling r in any direction to remote places without the aid of ucts. Fan is direct motor driven. Available with fan heels 18" thru 30" in diameter.

Free 3 NEW BOOKS TO SOLVE YOUR VENTILATING PROBLEMS



DE BOTHEZAT FANS DIVISION, Dept. T-1,
American Machine and Metals, Inc.
East Moline, Illinois

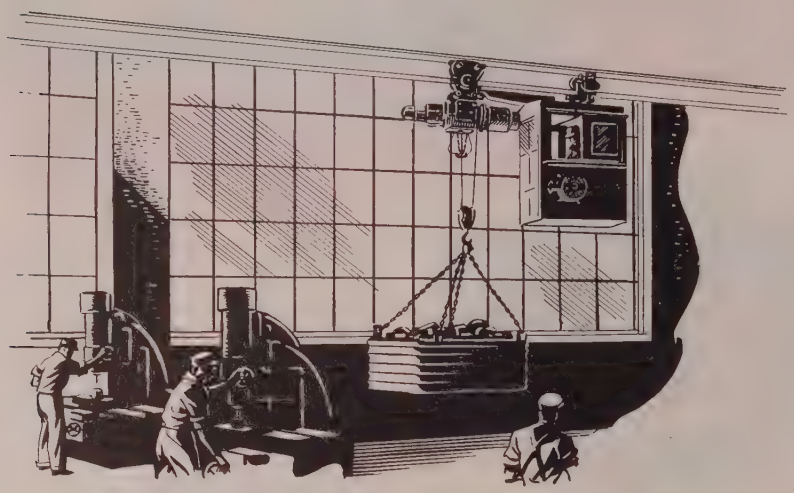
Please rush, without obligation, the following: ☐ LATERAL VENTILATION of TANKS ☐ BIFURCATOR CATALOG ☐ "HY-V" AIR JET CATALOG.

Firm

Address

City Zone State

MOVE LOADS THE FAST WAY



The Safe, Economical Way

THROUGH THE AIR!

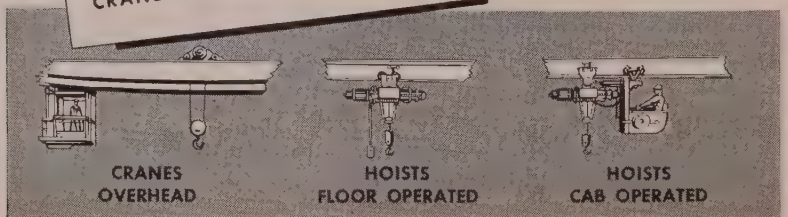
Modern materials handling systems use "through the air" movement wherever possible because of greater speed, economy and safety.

Analysis of specific problems will indicate need for the work characteristics of overhead cranes, floor or cab operated hoists, or a well planned combination of these lifting tools.

Shepard Niles specialists have valuable data on all three, plus the impartiality of judgment that comes naturally to those who make and sell all three!

SHEPARD NILES
CRANE AND HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads.



358 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

(*Continued from Page* 304)

New Plant and Equipment Expenditures

Millions of Dollars
(Figures are rounded and will not necessarily add to totals)

Qtrs.	Manufacturing 1948	Manufacturing 1947	All Industries 1948	All Industries 1947
1st	1,800	1,450	4,170	3,160
2nd	2,140	1,850	4,810	3,940
3rd	2,160	1,870	4,950	4,140
4th	1,940	2,290	4,690	4,940
Total	8,030	7,460	18,630	16,180

Yearly Totals

	Mfg.	All Industries		Mfg.	All Industries
1948	8,030	18,630	1943	2,250	4,530
1947	7,460	16,180	1942	2,760	6,110
1946	5,910	12,040	1941	3,400	8,190
1945	3,210	6,630	1940	2,580	6,490
1944	2,390	5,210	1939	1,930	5,200

Securities & Exchange Commission

Gear Sales

Indexes of New Orders Placed
Average Month 1935-1939=100

	1948	1947	1946	1943	1939	1935
Jan.	346.8	317.0	265.8	326.0	87.7	67.2
Feb.	324.4	303.0	225.4	365.8	84.3	63.4
Mar.	389.8	342.9	265.9	417.0	105.0	61.8
Apr.	320.9	346.2	290.9	257.4	86.7	70.0
May	283.6	317.2	258.8	376.9	90.7	77.1
June	324.1	278.0	279.0	472.5	93.5	66.5
July	348.4	278.5	362.2	424.8	89.8	78.6
Aug.	335.6	261.6	330.9	347.8	93.7	99.6
Sept.	320.4	297.7	292.9	360.0	125.5	76.5
Oct.		317.7	345.4	390.6	133.3	75.1
Nov.		356.9	280.9	246.9	128.6	70.5
Dec.		343.6	386.1	411.2	110.0	77.8

American Gear Mfrs. Assn.

Electric Industrial Furnaces

New Orders

	Kilowatts 1948	Kilowatts 1947	Value 1948	Value 1947
Jan.	4,083	7,528	$550,000	789,000
Feb.	2,692	5,060	310,000	476,000
Mar.	4,487	6,514	776,000	551,000
Apr.	4,328	8,854	436,000	1,079,000
May	5,166	3,586	528,000	389,000
June	5,229	3,341	538,000	308,000
July	4,845	5,298	383,000	432,000
Aug.	4,853	4,464	390,000	565,000
Sept.	3,902	4,465	363,000	354,000
Oct.	....	6,378	.....	677,000
Nov.	....	3,344	.....	350,000
Dec.	....	26,435	.....	1,831,000
Total	....	85,267	.....	$7,801,000

Yearly Totals

	Kilowatts	Value
1947	85,267	$7,801,000
1946	79,498	8,430,000
1945	104,614	9,601,000
1944	128,981	10,146,000
1943	156,602	12,855,000
1942	490,559	39,052,000
1941	184,794	13,719,000

Industrial Furnace Mfrs. Assn, Inc.

Electric Industrial Trucks and Tractors

Shipments

	Domestic 1948	Domestic 1947	Export 1948	Export 1947	Total 1948	Total 1947
Jan.	270	294	46	26	316	320
Feb.	258	251	100	22	358	273
Mar.	288	283	50	37	338	320
Apr.	318	377	19	43	337	420
May	286	307	45	42	331	349
June	243	288	49	33	292	321
July	230	271	29	34	259	305
Aug.	214	339	61	26	275	365
Sept.	229	262	27	90	256	352
Oct.	...	303	..	72	...	375
Nov.	...	273	..	64	...	337
Dec.	...	317	..	77	...	394
Total	3,565		566		4,131	

Yearly Totals

	Domestic	Export	Total
1947	3,565	566	4,131
1946	2,714	160	2,874
1945	3,627	224	3,851
1944	4,380	395	4,775
1943	4,280	211	4,491
1942	4,365	207	4,572
1941	2,837	254	3,091

Bureau of the Census.

To Cut Your Costs in '49

We Offer You the Houghton line

FOR LOWER COST METAL WORKING:

- **CUTTING OILS**—*Straight, Soluble and All-Purpose Base*
- **QUENCHING OILS**—*Faster . . . longer life*
- **METAL CLEANERS**—*Alkaline, Emulsion and Detergent types*
- **HEAT TREATING SALTS . . .**
- **SOLID CARBURIZERS . . .**
- **RUST PREVENTIVES . . .**
- **DRAWING COMPOUNDS . . .**
- **PICKLING INHIBITORS . . .**
- **"FORTIFIED" LUBRICANTS . . .**

It's a line of industrial processing and maintenance products, built on a foundation of 83 years' experience. You'll find it boiled down to six pages of product listings and descriptions, in the folder shown above. We suggest you write for a copy for your reference file, and that you discuss these good money-value materials with the Houghton Man when he calls on you. Ask him, too, about Houghton Service, so helpful to plant men.

Mail to E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Please send me free copy of the Houghton Product Index.

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY & STATE_____

fast*
sure*
safe*

* three ways to describe BROSIUS clay guns in operation at the blast furnace tap hole. For 31 years BROSIUS engineers have diligently applied their experience to the design and production of efficient low-cost guns. That's why so many BROSIUS guns have been working so long—so well. Available electric, electric-hydraulic, steam—pedestal or column mounted. For fast, sure, safe guns—please write to us.

Edgar E. BROSIUS Company Inc.

SHARPSBURG • PITTSBURGH 15, PA.

Machine Tools

(1945-1947 Shipments = 100)

	Indexes of Orders—Total		Indexes of Orders—Domestic		Indexes of Shipments	
	1948	1947	1948	1947	1948	1947
Jan.	83.1	71.7	69.1	50.7	75.3	91.7
Feb.	77.3	63.8	64.6	48.0	87.1	92.4
Mar.	86.3	74.3	70.2	54.2	83.6	100.4
Apr.	86.3	69.8	72.2	51.0	82.0	93.3
May	73.5	76.9	62.1	60.6	82.6	89.2
June	83.4	90.9	71.5	73.7	94.4	84.1
July	74.0	81.1	60.7	64.4	62.4	65.4
Aug.	73.7	62.1	60.1	47.5	69.8	63.6
Sept.	73.1	63.7	61.5	49.0	84.7	77.0
Oct.	67.4	81.0	*53.4	65.0	80.4	94.8
Nov.	*73.0	75.6	*54.5	64.1	*75.0	84.7
Dec.	...	81.1	...	66.3	...	98.4

* Preliminary

Yearly Shipments

1947	$306,000,000	1943	$1,180,000,000
1946	$334,800,000	1942	$1,320,000,000
1945	$423,700,000	1941	$775,000,000
1944	$497,000,000	1940	$440,000,000
		1939	$200,000,000

National Machine Tool Builders' Association

Motors and Generators

New Orders—Thousands of Dollars

Qtrs.	Polyphase Induction Motors, 1-200 hp 1948	1947	DC Generators & Motors, 1-200 hp 1948	1947
1st	22,871	38,332	5,068	5,318
2nd	25,841	31,849	6,144	5,155
3rd	.....	22,328	....	4,118
4th	.....	29,534	....	5,790
Total	.....	122,043	....	20,381

Yearly Totals

	Polyphase Induction Motors, 1-200 hp	DC Generators & Motors, 1-200 hp
1947	122,043	20,381
1946	142,464	20,942
1945	87,621	37,194
1944	68,555	74,581
1943	84,862	83,494
1942	114,650	94,693
1941	78,357	38,723

National Electrical Mfgrs. Assn.

Pumps

(Steam, power, centrifugal, rotary)

New Orders—Thousands of Dollars

	1948	1947	1946	1945	1944
Jan.	3,819	3,428	2,836	3,451	3,606
Feb.	3,635	3,506	2,728	3,326	2,821
Mar.	4,703	3,464	2,489	3,284	3,206
Apr.	4,312	3,638	2,803	3,237	3,912
May	3,724	2,973	2,856	3,177	4,815
June	3,512	2,999	2,648	3,220	3,096
July	4,075	3,148	4,014	2,925	3,497
Aug.	4,520	3,843	3,789	2,258	4,175
Sept.	3,474	3,355	3,223	2,171	3,635
Oct.	....	3,475	3,581	2,975	4,016
Nov.	....	2,673	3,260	2,482	2,207
Dec.	....	3,480	3,035	1,925	2,242
Total	....	39,982	37,262	34,431	41,228

Yearly Totals

1943	74,570	1942	73,862	1941	43,269

Hydraulic Institute

Scale and Balances

(Except Laboratory)

Shipments

Qtrs.	Domestic	Export	Total
1948			
1st	$11,630,562	$997,090	$12,627,652
2nd	.....	.....	.....
1947			
1st	$9,381,333	$707,629	$10,088,962
2nd	10,982,831	955,627	11,938,458
3rd	10,572,234	1,065,418	11,637,652
4th	12,039,109	1,086,904	13,126,013
Total	$42,975,507	$3,815,578	$46,791,085

Total Shipments by Quarters and Years
(Including domestic and export)

Qtrs.	1946	1945	1944
1st	$7,168,887	$4,404,683	$3,961,066
2nd	7,150,403	4,518,637	4,418,145
3rd	7,751,426	n.a.	4,511,142
4th	9,864,280	n.a.	4,481,489
Total	$31,935,001	n.a.	$17,371,842
1939	.....	$13,523,646	

n.a. Not available.
Bureau of the Census.

SIMONDS
ABRASIVE CO.
PHILADELPHIA, PA.

Grinding Wheels

Try this on your centerless grinder

SIMONDS ABRASIVE CO.
Philadelphia, Pa.
Grinding Wheels and Abrasive Products

SIMONDS CANADA ABRASIVE CO. LTD.
Arvida, Quebec
Electric Furnace Abrasives

SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS SAW AND STEEL CO.
Fitchburg, Mass.
Saws, Machine Knives, Files

Other Divisions
SIMONDS STEEL MILLS
Lockport, N. Y.
Special Steels

SIMONDS CANADA SAW CO. LTD.
Montreal, Can.
Simonds Products for Canada

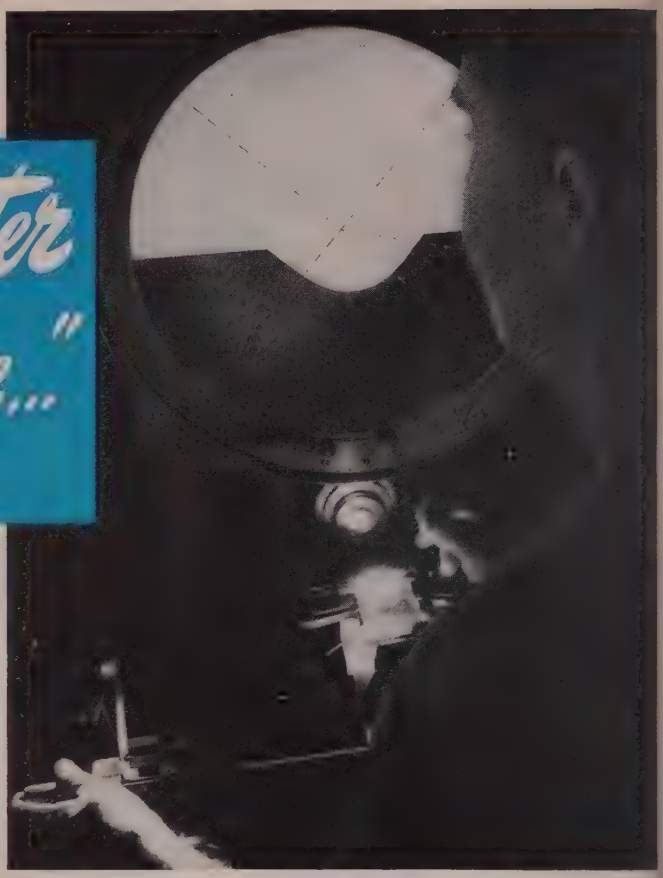
The proof of the pay-off is in its performance—in field reports revealing the facts and figures of superior finish, accurate stock removal and less cost—in the evidence that more and more users are adopting these wheels as standard—in the long record of top wheel performance duplicated on order after order.

These are the pay-off facts of superior wheel quality . . . mechanical accuracy in balancing and true running . . . and of wheel recommendations based on our practical knowledge of the centerless operation and long experience in providing the most efficient wheel for it.

Get the complete and factual pay-off details from our new centerless bulletin ESA-55. Write now.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

"In one quarter of the time..."



Inspecting tangent to the radius and the radius of a form tool, on a Jones & Lamson Optical Comparator. Dimensions must be held to .0002".

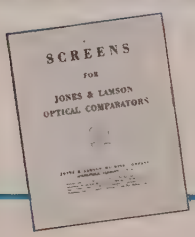
Photograph courtesy The U. S. Tool & Mfg. Co., Dearborn, Michigan

The U. S. Tool & Mfg. Co., manufacturer of Milling Cutters and Special Tools, says that this inspection operation is accomplished *"In one-quarter of the time other methods of inspection would take."*

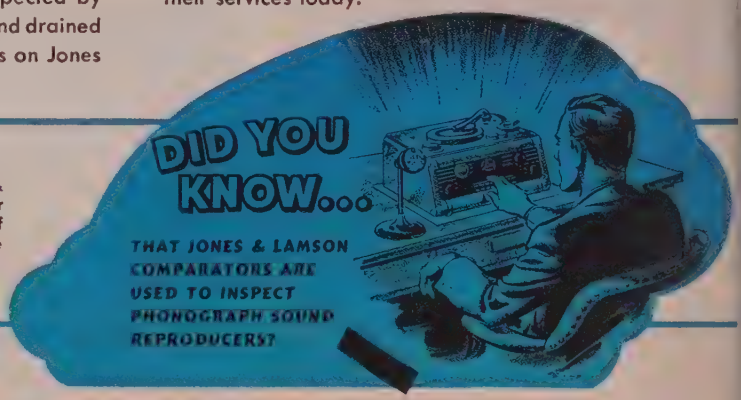
Inspection with Jones & Lamson Comparators leaves no room for doubt; the evidence is positive, conclusive and clearly visible.

Many components and products formerly inspected by slow, tedious methods, that retarded production and drained profits, are now inspected in seconds or minutes on Jones & Lamson Comparators, by operators with only a minimum of instruction. Savings are made all along the line, in gage cost, in time and in overhead.

Our engineers are inspection specialists; their knowledge of holding fixtures, handling methods and suitable Comparator equipment has saved hundreds of thousands of dollars throughout the country. Call, write or wire for their services today.



Every owner of a Jones & Lamson Optical Comparator should have this catalog of standard glass screens. Write to Dept. 710 for your copy.



Optical Comparator Division

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

Fans and Blowers

New Orders—Thousands of Dollars

rs.	1948	1947	1946	1945
....	11,809	14,953	13,413	10,975
l	12,322	10,286	16,604	14,151
....	.....	8,452	17,382	10,338
....	.....	10,985	15,292	12,262
Total	.....	44,676	62,691	47,726

Yearly Totals

44	47,174	1942	57,048
43	55,888	1941	33,007

U. S. Bureau of the Census

rthmoving, Excavating Equip.

Shipments—Dollar Value

Power Cranes and Shovels

	1948	1947	1946
Qtr. ..	38,094,651	30,554,906	16,718,616
d Qtr...	42,127,330	33,018,607	19,824,409
i Qtr. ..	37,180,954	31,241,614	18,180,401
h Qtr. ..	.....	38,021,190	26,600,098
tal	.....	132,836,317	81,323,524

oad Construction and Maintenance Machinery

t Qtr. ..	28,524,625	24,051,967	n.a.
d Qtr. ..	30,616,159	25,594,095	n.a.
d Qtr. ..	29,793,211	22,514,533	n.a.
h Qtr. ..	.....	27,168,105	n.a.
otal	.....	99,328,700	n.a.

Construction Machinery for Mounting on Tractors

t Qtr. ..	11,728,482	9,799,865	n.a.
d Qtr. ..	10,806,549	10,946,890	n.a.
d Qtr. ..	11,239,280	9,419,468	n.a.
h Qtr. ..	.....	10,555,573	n.a.
otal	.....	40,721,796	n.a.

Tracklaying Tractors

t Qtr. ..	42,114,315	30,990,637	15,845,031
d Qtr. ..	37,042,955	34,928,273	17,569,858
d Qtr. ..	38,382,253	30,178,296	18,946,690
h Qtr. ..	.....	38,263,786	28,994,374
otal	.....	134,360,992	81,355,953

Wheel-type Heavy Duty Industrial Tractors

t Qtr. ..	6,282,846	3,314,490	n.a.
d Qtr. ..	5,430,295	4,491,741	n.a.
d Qtr. ..	5,336,329	5,941,195	n.a.
h Qtr. ..	.....	4,330,875	n.a.
otal	.....	18,528,301	n.a.

Portable Well and Blast Hole Drills

t Qtr. ..	3,181,240	2,471,988	664,495
d Qtr. ..	3,272,353	2,676,919	1,133,329
d Qtr. ..	2,712,719	3,152,184	1,475,113
h Qtr. ..	.....	3,124,735	2,116,402
otal	.....	11,425,826	5,389,339

n.a. Not available.
U. S. Bureau of the Census.

Farm Machinery, Equipment

(exclusive of tractors)

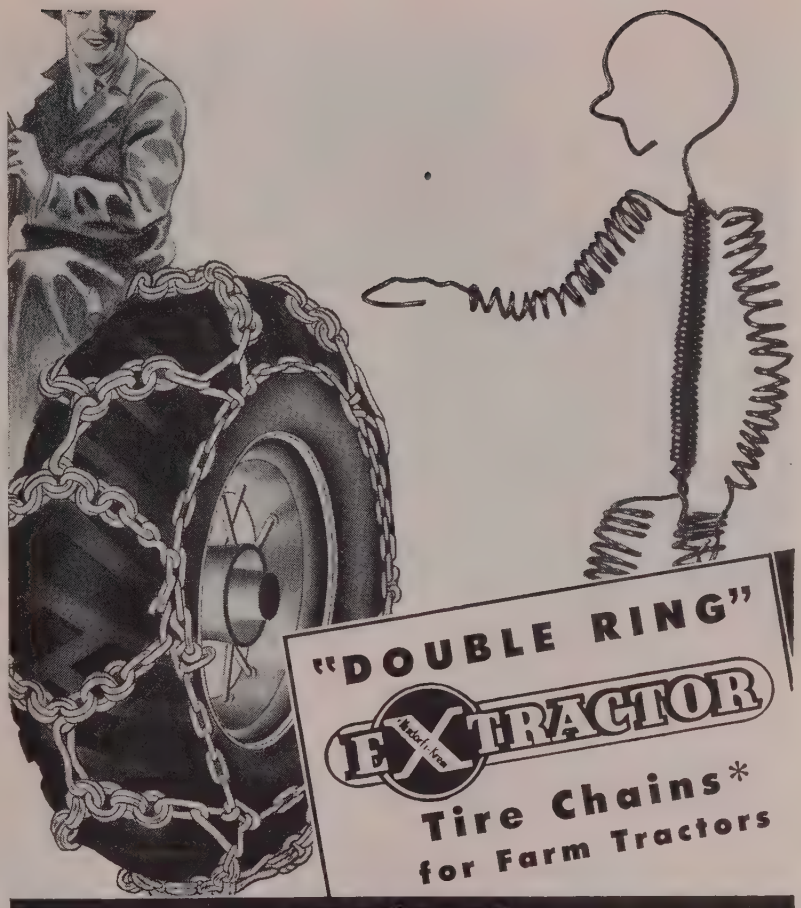
Manufacturers' Shipments of Complete Units, Attachments and Parts

	Domestic	Export
947	$1,109,307,898	$155,607,451
946	763,230,488	87,247,115
945	612,595,399	87,581,956
944	549,310,771	68,069,766
943	301,581,890	42,059,120

Totals

947 ..	$1,264,915,349	1944 ..	$617,380,537
946 ..	850,477,603	1943 ..	343,641,010
945 ..	700,177,355		

U. S. Bureau of the Census



made of
KEYSTONE WIRE

Heavy double ring construction gives Extractor Tire Chains double wear, double traction. The double rings lie flat when traction is not needed . . . prevents damage to concrete or grassy fields . . . and gives a smoother ride.

Tractor chains must be huskily built to withstand the powerful wheel thrusts . . . the chain links must be tough and strong. Extractor Chains are formed from extra brite Keystone Wire that has excellent welding qualities as well as proper ductility for easy forming and twisting. The wire has favorable heat-treating and hardening characteristics that count for abrasion resistance and long wear.

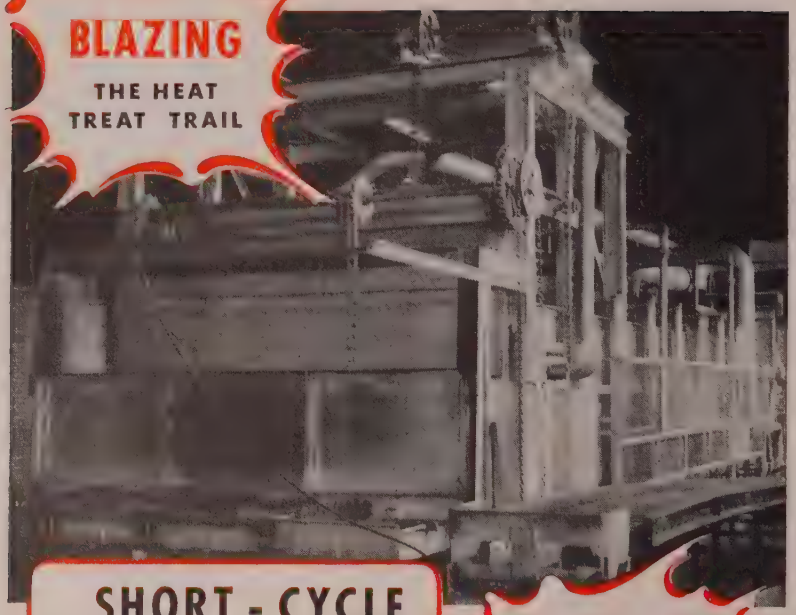
Yes, we are proud that sturdy Keystone Wire is such a major factor in the fine construction of Extractor Tire Chains.

** Nixdorff-Krein Mfg. Co.*
St. Louis 6, Missouri

KEYSTONE
MUSIC SPRING WIRE
KEYSTONE STEEL & WIRE CO.
PEORIA ILLINOIS

SPECIAL ANALYSIS WIRE
for all industrial purposes

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS



SHORT-CYCLE MALLEABLE ANNEALING FURNACE

Another example of Holcroft "trail blazing"—the first radiant tube continuous furnace for short-cycle malleable annealing, installed more than 10 years ago and still producing economically.

DEVELOPED BY Holcroft IN 1936

Short-cycle malleable annealing is a fast, economical process which offers the following advantages to large-volume manufacture:

- The process requires as little as *14 hours*, as compared to *several days* for other methods. This means reduced inventories and faster shipments.
- It produces *clean, scale-free work* which can go directly to shop or assembly without further processing.
- It permits the use of *light-walled containers* — reduces dead weight by as much as 400%, and cuts fuel bills correspondingly.
- It enables large and small castings to be handled simultaneously.
- Compared to other methods, it gives several times the production per unit of floor area.

Although continuous furnaces are most frequently used, this process is also successfully applied to batch-type furnaces. As with all Holcroft furnaces, each installation is *designed individually* for the specific application, thus meeting every requirement of production and quality with maximum over-all economy.

In ordering production heat treat furnaces for ANY need, it will pay you to take advantage of Holcroft engineering leadership. And remember—Holcroft offers you *complete metallurgical and engineering service*, from individual furnace design through the trial run in your plant.

SINCE 1916 Holcroft AND COMPANY

BUILT BY HOLCROFT & COMPANY DETROIT-MICH

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

6545 EPWORTH BLVD. DETROIT 10, MICHIGAN

CHICAGO 3
C. H. MARTIN, A. A. ENGELHARDT
1017 PEOPLES GAS BLDG.

CANADA
WALKER METAL PRODUCTS, LTD.
WALKERVILLE, ONTARIO

HOUSTON 1
R. E. McARDLE
5724 NAVIGATION BLVD.

STATISTICS

Tractors

Manufacturers' Shipments

	Number	Value
Wheel Type—For Farm Use		
1947	405,654	$325,090,377
1946	243,271	180,362,770
1945	224,985	153,170,002
1944	235,453	157,518,924
1943	94,550	55,943,859
Wheel Type—For Non-Farm Use		
1947	14,350	$17,477,909
1946	12,067	11,909,354
1945	18,707	15,725,730
1944	14,502	12,593,984
1943	9,317	7,272,952
Tracklaying Type—For Farm Use		
1947	11,619	$28,197,345
1946	8,898	18,117,637
1945	11,149	20,973,907
1944	6,221	10,414,553
1943	2,906	6,688,395
Tracklaying Type—For Non-Farm Use		
1947	25,988	$106,017,898
1946	17,367	64,816,042
1945	32,849	191,033,573
1944	38,966	250,168,422
1943	27,746	135,505,932

U. S. Bureau of the Census

Freight Car Awards

Number of Cars

	†*1948	*1947	*1946	1945	1944
Jan.	8,613	9,222	1,481	7,200	1,020
Feb.	10,698	13,724	2,328	1,750	13,240
Mar.	13,227	12,048	3,512	2,500	6,510
Apr.	16,927	9,186	3,564	1,120	4,519
May	2,229	7,389	2,900	1,526	1,952
June	5,868	12,784	3,335	670	1,150
July	11,523	14,840	14,836	3,500	795
Aug.	3,788	2,352	9,527	7,240	3,900
Sept.	840	9,917	11,102	12,840	400
Oct.	11,431	17,737	3,407	1,320	2,425
Nov.	....	8,079	6,690	1,650	1,065
Dec.	....	4,030	3,441	4,116	16,245
Total	....	121,308	66,723	45,432	53,221

* American Railway Car Institute.
† Tentative.

Freight Car Shipments

Domestic—Units

	1948 Car-Builders	1948 Railroad Shops	1948 Total	1947 Car-Builders	1947 Railroad Shops	1947 Total
Jan.	6,561	2,388	8,949	2,265	717	2,982
Feb.	6,306	2,157	8,463	1,784	509	2,293
Mar.	6,940	2,362	9,302	2,439	444	2,883
Apr.	6,726	2,326	9,052	3,489	634	4,123
May	6,651	2,541	9,192	3,131	798	3,929
June	7,731	2,650	10,381	4,230	1,297	5,527
July	6,874	1,832	8,706	4,846	1,033	5,879
Aug.	7,450	2,912	10,362	4,346	1,675	6,021
Sept.	6,978	2,775	9,753	5,668	2,077	7,745
Oct.	6,649	2,285	8,934	6,242	2,122	8,364
Nov.	6,979	2,307	9,268	6,889	2,049	8,938
Dec.	....	....	....	7,661	2,177	9,838

Yearly Totals (All Shops)

1947	68,522	1940	62,341	1933	2,163
1946	41,955	1939	25,132	1932	3,252
1945	43,864	1938	16,470	1931	13,203
1944	43,003	1937	77,498	1930	74,920
1943	31,836	1936	46,612	1929	81,590
1942	62,873	1935	7,515	1928	46,060
1941	80,623	1934	25,176	1927	63,370

American Railway Car Institute.

Railroad Passenger Cars

Shipments—Units

	1948	1947	1946	Monthly Averages	
Jan.	83	58	494	1947	58
Feb.	74	69	9	1946	114
Mar.	94	53	21	1945	77
Apr.	121	73	240	1944	83
May	64	60	181	1943	59
June	46	67	56	1942	33
July	62	53	61	1941	30
Aug.	61	20	68	1940	23
Sept.	65	29	69	1939	23
Oct.	..	74	45	1938	29
Nov.	..	69	60	1937	46
Dec.	..	71	60	1936	13

Association of American Railroads

"Standard" Tubing Techniques

Fabrication by "Standard" Makes Tubular Parts Like These Possible

OUR experience and facilities for upsetting, flanging, swaging, spinning, flaring, precision straightening and other difficult fabricating operations, make "Standard" electric weld tubing adaptable to any tubular assembly or part.

Specify "STANDARD"—it pays!

Sizes ½" O.D. to 5½" O.D., 22 B.W.G. to 3 B.W.G.

THE STANDARD TUBE CO.
Detroit 28, Michigan
Welded Tubing — Fabricated Parts
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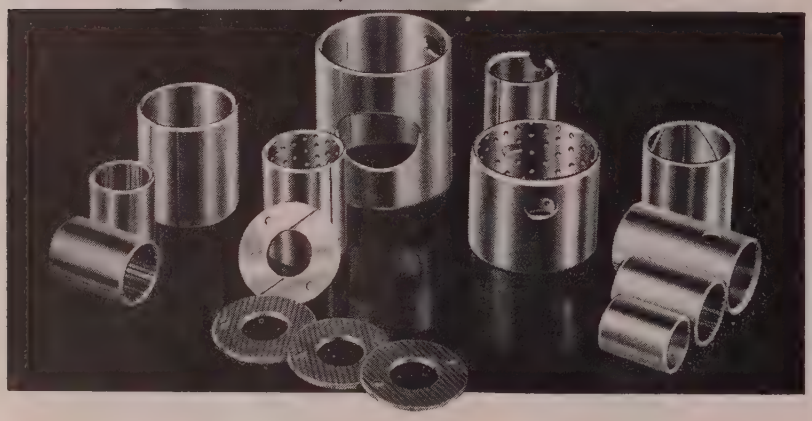


● You need not experience costly delays in securing thin wall bearings and bushings. Here at Johnson Bronze, we are equipped to furnish promptly your requirements, made to your specifications . . . and within a period of days, not weeks.

Johnson Bronze bearings assure you of top quality in materials and workmanship. We produce them in rolled sheet bronze . . . bronze on steel . . . babbitt on steel. Our facilities for manufacturing thin wall bearings are complete . . . our help is skilled . . . and our experience dates back forty years.

If we can assist you in better delivery or improved quality . . . write, wire or call today.

JOHNSON BRONZE COMPANY
550 S. Mill St. New Castle, Pa.

Locomotives

Diesel and Electric
Unfilled Orders*

	1948	1947	1946	Monthly Averages	
Jan.	1,417	586	373	1947	799
Feb.	1,488	635	378	1946	473
Mar.	1,431	588	412	1945	398
Apr.	1,455	626	416	1944	445
May	1,485	718	522	1943	550
June	1,572	770	529	1942	501
July	1,509	786	528	1941	260
Aug.	1,510	811	487	1940	60
Sept.	1,477	795	490	1939	50
Oct.	....	922	506	1938	24
Nov.	....	1,147	499	1937	28
Dec.	....	1,196	540	1936	18

* Includes total of all shops. Number produced in railroad shops is very small.
Association of American Railroads

Steam Locomotives
Unfilled Orders

	1948			1947		
	Equip. Makers	Rail Shops	Total	Equip. Makers	Rail Shops	Total
Jan.	76	20	96	48	5	53
Feb.	89	19	108	42	3	45
Mar.	89	30	119	51	1	52
Apr.	89	28	117	36	0	36
May	86	25	111	30	0	30
June	101	22	123	24	0	24
July	99	20	119	29	0	29
Aug.	99	17	116	40	0	40
Sept.	86	15	101	36	10	46
Oct.	..	..	...	35	10	45
Nov.	..	..	...	23	10	33
Dec.	..	..	...	20	10	30

Monthly Averages
Unfilled Orders, All Shops

1947	39	1944	177	1941	240	1938
1946	73	1943	422	1940	97	1937
1945	114	1942	343	1939	58	1936

Association of American Railroads

Electric Output

Millions of Kilowatt-hours

1948—By Weeks

Jan. 3	4,868	May 1	5,042	Sept. 4	5,470
Jan. 10	5,278	May 8	5,087	Sept. 11	5,166
Jan. 17	5,370	May 15	5,109	Sept. 18	5,428
Jan. 24	5,436	May 22	5,085	Sept. 25	5,461
Jan. 31	5,429	May 29	5,076	Oct. 2	5,449
Feb. 7	5,412	June 5	4,845	Oct. 9	5,482
Feb. 14	5,385	June 12	5,132	Oct. 16	5,432
Feb. 21	5,254	June 19	5,159	Oct. 23	5,539
Feb. 28	5,252	June 26	5,257	Oct. 30	5,555
Mar. 6	5,293	July 3	5,166	Nov. 6	5,563
Mar. 13	5,285	July 10	4,760	Nov. 13	5,571
Mar. 20	5,145	July 17	5,197	Nov. 20	5,627
Mar. 27	5,065	July 24	5,342	Nov. 27	5,374
Apr. 3	5,037	July 31	5,352	Dec. 4	5,644
Apr. 10	5,033	Aug. 7	5,319	Dec. 11	5,703
Apr. 17	5,087	Aug. 14	5,318	Dec. 18	5,794
Apr. 24	5,042	Aug. 21	5,391	Dec. 25	...
		Aug. 28	5,478		

Total Yearly Generation by Plants Contributing to Public Supply

Millions of Kwh

1947.	255,725	1944.	228,189	1941.	168,17
1946.	223,178	1943.	217,759	1940.	144,98
1945.	222,486	1942.	189,181	1939.	130,33

Edison Electric Institute and Federal Power Commission.

Merchant Ship Construction

In Private U. S. Yards†

Year	No.	Gross Tonnage	Year	No.	Gross Tonnage
1948*	17	96,588	1938	26	185,65
1947	50	286,473	1937	15	121,85
1946	88	672,554	1936	8	63,42
1945	1,067	7,663,362	1935	2	19,02
1944	1,463	11,404,404	1934	2	9,54
1943	1,661	12,499,873	1933	4	49,52
1942	724	5,392,953	1932	15	145,47
1941	95	749,105	1931	14	150,94
1940	53	444,727	1930	16	151,20
1939	28	241,052	1929	7	57,39

† Ships include cargo, tanker and passenger & cargo over 2000 tons.
* First six months of 1948. As of July 1, 1948, U. S. private shipyards had on order 4 ships with total gross tonnage of 39,595.
Shipbuilders Council of America

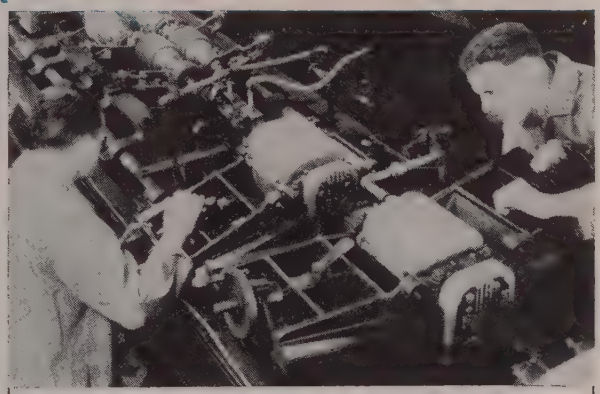
rst in a series of
nusual Grinding
heel Operations

Giving the RAZOR BLADE a close shave!

"Look Sharp — Feel Sharp — Be Sharp" . . . This world famous slogan has a definite relationship with the exacting requirements that the Gillette Safety Razor Co. place upon BAY STATE grinding wheels. Just imagine the precision limits that require a scientifically directed beam of light to measure the keenness of a cutting edge!

Whatever YOUR grinding problem may be, BAY STATE can solve it . . . fast. Possibly the exact specifications to meet your requirements can be supplied directly from large stocks either in Westboro, branch warehouses, or our distributor stocks strategically located throughout the United States.

Send us your grinding problems. We can help you.



Photograph, Courtesy of Gillette Safety Razor Company.

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Westboro, Massachusetts, U. S. A.
Branch Offices and Warehouses – Chicago, Cleveland, Detroit.
Distributors — All Principal Cities

Top Performance Consistently Duplicated

Productively Generate

SURFACE FLATNESS

MICROFLAT MACHINES

This cast iron valve plate for a refrigeration unit is finished on a double surface Microflat Machine to 8-microinch r.m.s. finish—optically flat and both sides parallel within 0.0001-inch. Production rate is 20 pieces per minute.

FINISH flat surfaces, on any material from soft copper to quartz or nitralloy, regardless of the shape or size of the part, in high production. Opposite sides of one or many parts are finished simultaneously on double surface machines,—productively produced to one light band of flatness and within one microinch r.m.s. surface finish. Recessed surfaces may also be finished on single surface machines.

Let us send more information at your request.

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616 Empire Bldg., 206 S. Main St., Rockford, Ill.
55 George St., Brantford, Ont., Canada
Micromold Manufacturing Div., Boston Post Road, Guilford, Conn.

Naval Shipbuilding

Deliveries from Private Yards, 1947*

Type	No.	Displacement Tonnage
Destroyers	3	6,600
Destroyer Tender	1	8,000
Aircraft Carriers	2	59,500
Sub Rescue Vessel	1	1,598
Ice Breaker	1	5,300
Total	8	80,998

Private Yards' Naval Backlog, Jan. 1, 1948

Large Cruiser	1	27,500
Heavy Cruisers	3	51,000
Light Cruisers	2	29,400
Destroyers	3	6,600
Total	9	114,500

* No new contracts have been placed in private yards on naval shipping since the end of the war.

Shipbuilders Council of America

Finished Steel Consumption by U. S. Shipbuilders

Net Tons

Year	Tonnage	Per cent Total Output	Year	Tonnage	Per cent Total Output
1948..	574,909*	0.9	1938..	390,000	1.7
1947..	339,134	0.5	1937..	391,000	0.9
1946..	283,803	0.6	1936..	288,000	0.8
1945..	2,719,000	4.8	1935..	207,000	0.8
1944..	10,287,000	16.0	1934..	233,000	1.1
1943..	11,509,000	19.2	1933..	115,000	0.6
1942..	9,440,000	15.6	1932..	102,000	0.9
1941..	2,733,000	4.4	1931..	224,000	1.0
1940..	940,000	2.1	1930..	371,000	1.1
1939..	518,000	1.3	1929..	346,000	0.8

Estimated by STEEL

Shipbuilders Council of America and American Iron & Steel Institute

Truck Trailers

1948	Production Units	Shipments Units	Shipments Value
Jan.	3,373	3,303	$ 9,216,540
Feb.	3,454	3,764	11,258,867
Mar.	4,137	4,573	13,339,443
Apr.	4,116	4,736	13,313,997
May	3,688	3,985	11,544,799
June	4,047	4,113	12,108,978
July	3,437	3,773	11,037,752
Aug.	3,622	4,196	12,751,751
Sept.	....	....	.....
Oct.	....	....	.....
Nov.	....	....	.....
Dec.	....	....	.....

Production, Units

1947....53,096	1941....41,869
1946....76,234	1940....27,118
1945....33,266 civilian and 83,967 military	1939....24,182
	1937....21,747
1944....24,092 civilian and 185,349 military	1935....18,895
1943....8,054 civilian and 188,811 military	
1942....8,408 civilian and 71,520 military	

U. S. Bureau of the Census

Housing Trailers

	Production—Unit 1948	Production—Unit 1947	Shipments—Dollars 1948	Shipments—Dollars 1947
Jan.	4,305	5,303	7,219,729	8,287,711
Feb.	4,164	4,791	6,851,148	7,398,114
Mar.	4,958	4,903	8,504,406	7,664,976
Apr.	5,517	5,425	10,151,077	8,682,555
May	5,881	5,714	10,613,639	9,324,548
June	6,769	6,333	12,411,885	10,032,503
July	....	6,051	.....	9,814,506
Aug.	....	6,741	.....	10,859,510
Sept.	....	6,986	.....	11,634,920
Oct.	....	7,836	.....	13,251,930
Nov.	....	6,083	.....	10,001,422
Dec.	....	5,508	.....	8,788,434

Yearly Production Totals

1947	71,674	1945	16,225
1946*	48,000	1939	11,782

* Estimated

Bureau of the Census

Simonds INDUSTRIAL Gears

SIMONDS has been a good name to remember for industrial gears of popular types and sizes in all materials for more than 50 years. Today . . . more than ever . . . you should look to SIMONDS for the latest in proved gear advancements and seasoned craftsmanship. SIMONDS specializes in large diameter gears —Spur Gears up to 145" dia.—Bevel and Mitre Gears up to 60" dia.—Worm Gears up to 72" dia. All materials, too—cast or forged steel, gray iron, bronze, silent steel, rawhide or bakelite. Send SIMONDS your inquiries for industrial gears to meet your most critical requirements.

MEMBER OF AGMA

THE SIMONDS GEAR & MANUFACTURING CO.

LIBERTY AT 25th · PITTSBURGH 22, PA.

Distributors for RAMSEY Silent Chain Drives and Couplings

How 5 hours per part were saved on CHROMIUM FINISHING

1.

COSTLY PROBLEM:

Here was a manufacturer who started to chromium plate thread gauges—both to improve appearance and to prolong product accuracy. But the plate was not being deposited evenly—requiring far more chromium than necessary, to permit grinding to tolerances.

2.

EVEN MORE COSTLY were the hours spent grinding and polishing—a slow process. The manufacturer was faced with the prospect that the chromium finish might have to be eliminated.

3.

A WAY OUT? Yes, a quick phone call to United Chromium for help under his U. C. Technical Service agreement might produce an answer.

4.

THERE WAS! A U. C. engineer examined the plating procedure being followed and the equipment used for this job. Then, after studying cross-sections of several gauges, he came up with the solution.

5.

THE ANSWER! He recommended machining the gauge threads slightly off angle. With controlled plating, they would build up to exact size consistently.

6.

THE PAY-OFF!

". . . the lustrous, smooth plate now held to exact tolerances . . . requires only slight polishing after plating." Savings in plating and finishing were estimated at 5 hours per part.

• • •

One more case which demonstrates the basic value of UC's technical service and its 20 years' chromium plating engineering experience. You can count on this service to help you cut costs, boost output, maintain specified plating quality, and keep up-to-date on every new advance in plating technique.

Write for our bulletin CR-2 which gives more details.

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Trade Mark Reg. U. S. Pat. Off.

UNITED CHROMIUM, INCORPORATED

PROCESSES AND MATERIALS FOR SURFACES THAT SURVIVE

51 East 42nd St., New York 17, N.Y. • Detroit 7, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Dayton 2, Ohio • Los Angeles 13, Cal.

STATISTICS

Automobile Production

	Passenger Cars	Trucks	Total
1948			
n.	328,148	114,782	442,930
b.	284,930	115,647	400,577
ar.	364,953	150,270	515,223
or.	318,387	142,577	460,964
ay	235,752	119,759	355,511
ne	328,455	130,205	458,960
ly	367,108	120,658	487,766
g.	356,193	120,401	476,594
pt.	314,547	116,943	431,490
t.	393,634	112,017	505,651
ov.	372,097	124,627	496,724
ec.	.....	.....	.....
1947			
n.	263,938	111,221	375,159
eb.	277,471	122,497	399,968
ar.	317,197	125,196	442,393
pr.	327,568	122,284	449,852
ay	296,175	95,303	391,478
ne	320,050	98,996	419,046
ly	293,187	106,269	399,456
ug.	269,876	92,099	361,975
pt.	325,505	126,848	452,353
t.	334,994	126,649	461,643
ov.	322,087	95,448	417,535
ec.	379,341	108,373	487,714
47 Total	3,727,389	1,331,183	5,058,572
Annual Production			
	Passenger Cars	Trucks	Total
46	2,247,795	1,019,939	3,267,734
45	85,654	832,017	917,671
44	.....	972,000	972,000
43	.....	965,400	965,400
42	218,872	1,106,153	1,325,025
41	3,838,345	1,270,647	5,108,992
40	3,802,239	890,128	4,692,367
39	2,965,165	757,553	3,732,718

Ward's Automotive Reports

Refined Copper

Net Tons

	Production	Deliveries	Stocks
48.....	1,190,000*	1,300,000*	70,000*
47.....	1,196,393*	1,383,666*	76,035*
46.....	604,071	1,260,921	80,832
45.....	843,113	1,517,842	76,512
44.....	1,098,788	1,636,295	66,780
43.....	1,206,871	1,643,677	52,121
42.....	1,135,708	1,635,236	65,309
41.....	1,065,667	1,545,541	75,564
40.....	1,033,710	1,001,886	142,772
39.....	818,289	814,407	159,485
38.....	638,076	481,303	289,755

Copper Institute Inc.
* Estimated by STEEL

U. S. Refined Lead

Net Tons

	Production	Domestic Shipments	Stocks At End
48.....	534,000*	532,000*	24,000*
47.....	583,716	608,421	21,787
946.....	413,903	411,433	48,088
45.....	524,328	500,003	43,476
944.....	538,618	552,063	19,536
943.....	546,673	548,417	33,090
42.....	633,818	618,947	34,937
941.....	634,888	655,542	20,185
940.....	585,480	603,143	40,926
939.....	497,991	555,074	58,777
938.....	408,539	421,625	115,902

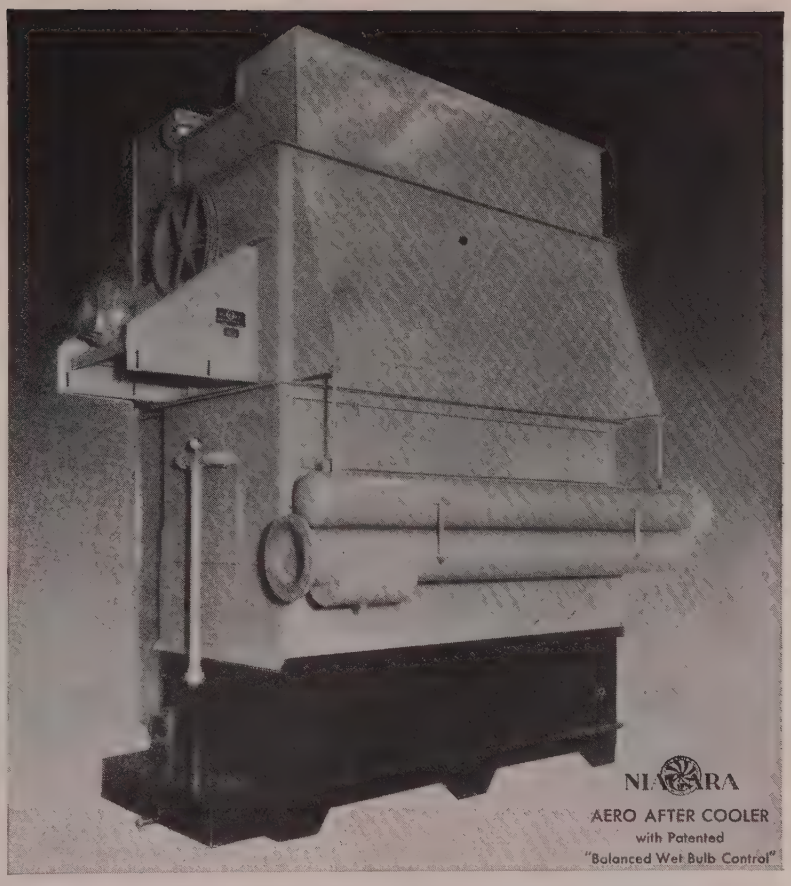
American Bureau of Metal Statistics
* Estimated by STEEL

Aluminum

Net Tons

	Primary		Secondary
ear	Production	Apparent Consumption	Production
48...	625,000*	630,000*	180,000*
47...	571,750	570,923	190,144
946...	409,630	461,877	207,574
945...	495,060	797,220	298,387
944...	776,446	744,627	325,645
943...	920,179	877,349	313,961
942...	521,106	588,969	196,464
941...	309,067	302,788	106,857
940...	206,280	227,017	80,362
939...	163,545	167,646	53,947
938...	143,441	89,523	38,800

U. S. Bureau of Mines
* Estimated by STEEL



How to PREVENT CONDENSATION in COMPRESSED AIR LINES

● Users of pneumatic tools and machinery spend thousands of dollars on repairs and suffer much interruption to production from the condensation of water in their air lines. In compressed gas systems and in processes where compressed air is blown directly on parts and materials in production, there is additional damage.

You can prevent these losses by installing a Niagara Aero After Cooler. It cools the compressed air or gas by evaporative cooling and removes the water before the air enters the receiver. This method brings the air to within a few degrees of the wet bulb temperature, making certain that your compressed air will always be colder than the atmosphere surrounding the lines in your plant, so that no further condensation can take place.

Savings in cooling water pay for the installation. Experience shows that the patented Niagara evaporative cooling method consumes less than 5% of the water required for cooling by conventional means. You save the cost of the water, the cost of pumping it, the cost of disposing of it. These extra savings soon pay for the Niagara Aero After Cooler.

Write for Bulletin No. 98

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Over 35 Years of Service in Industrial Air Engineering

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INDUSTRIAL COOLING • HEATING • DRYING

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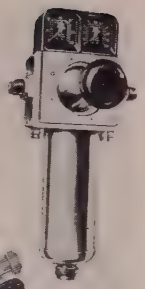
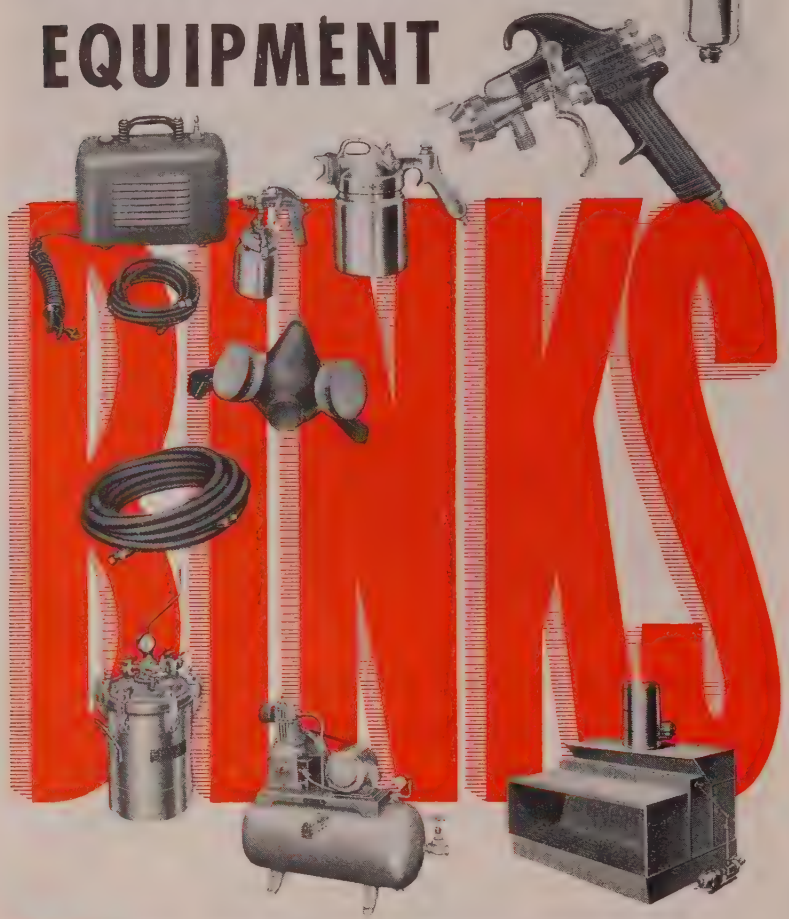
HUMIDIFYING • AIR ENGINEERING EQUIPMENT

THE BIG NAME IN SPRAY FINISHING EQUIPMENT





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BIG name companies standardize on it

BIG savings are effected with it

BIG production is simplified with it

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"...We must think BIG and plan BIG if we are to retain our leadership. It's the only way."

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President.

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Containers and Closures

Shipments for Sale—Number of Units

Heavy Steel Barrels and Drums

	1948	1947	1946
Jan.	2,239,132	2,316,552	1,705,431
Feb.	2,097,649	2,065,821	838,710
Mar.	2,516,252	2,292,357	1,423,659
Apr.	2,290,066	2,459,232	1,987,635
May	2,018,503	2,312,378	1,874,939
June	2,244,107	2,253,029	1,782,187
July	2,084,272	2,184,761	2,019,305
Aug.	2,305,825	2,212,068	2,404,846
Sept.	2,165,008	2,200,756	2,036,308
Oct.	.....	2,305,055	2,351,089
Nov.	.....	2,075,066	2,212,532
Dec.	.....	2,384,968	2,092,705

Yearly Totals

1947 ..	27,061,963	1944 ..	19,931,227
1946 ..	22,729,346	1943 ..	27,219,206
1945 ..	22,251,101		

Light Steel Barrels and Drums

	1948	1947	1946
Jan.	613,305	466,307	561,540
Feb.	563,115	430,170	433,964
Mar.	655,552	417,122	514,518
Apr.	642,957	542,973	584,528
May	602,671	470,474	602,843
June	683,450	499,808	530,930
July	592,658	505,754	481,081
Aug.	654,319	554,208	617,805
Sept.	575,547	488,212	517,883
Oct.	.....	572,424	587,018
Nov.	.....	485,571	475,322
Dec.	.....	599,181	524,706

Yearly Totals

1947 ..	6,032,304	1944 ..	5,173,000
1946 ..	6,432,138	1943 ..	3,941,426
1945 ..	6,564,746		

Steel Shipping Packages, Kegs and Pails

	1948	1947	1946
Jan.	4,305,299	5,618,218	3,885,002
Feb.	3,943,179	4,663,638	2,845,238
Mar.	5,128,684	4,762,732	3,918,588
Apr.	4,666,580	5,542,271	4,128,547
May	4,315,694	5,127,327	4,054,385
June	4,760,658	4,774,813	4,219,615
July	4,360,827	4,329,432	3,888,799
Aug.	5,243,276	4,368,779	5,066,048
Sept.	5,234,888	4,456,440	4,701,462
Oct.	.....	4,765,261	5,426,322
Nov.	.....	4,314,604	4,894,725
Dec.	.....	4,857,600	4,821,015

Yearly Totals

1947 ..	57,581,115	1945 ..	57,698,050
1946 ..	51,808,792		

Metal Cans

Tons of Steel Consumed in Shipments for Sale

	1948	1947	1946
Jan.	181,392	138,211	149,207
Feb.	169,968	123,767	104,975
Mar.	169,018	142,649	144,833
Apr.	164,565	160,095	155,894
May	174,830	165,095	211,257
June	239,723	193,281	205,462
July	274,083	275,541	276,459
Aug.	350,487	344,236	300,870
Sept.	351,627	310,937	277,829
Oct.	.....	240,670	222,307
Nov.	.....	182,342	161,951
Dec.	.....	222,797	167,637

Yearly Totals

1947 ..	2,499,621	1944 ..	1,760,855†
1946 ..	2,348,681	1943 ..	1,421,798†
1945 ..	2,275,438†		

† Estimated.
U. S. Bureau of the Census.

U. S. Slab Zinc

Net Tons

	Production	Shipments	Stocks at End
1948.....	850,000*	892,000*	26,011*
1947.....	848,027	955,816	68,011
1946.....	759,346	842,937	175,800
1945.....	799,520	777,649	259,391
1944.....	901,332	837,322	237,520
1943.....	971,873	887,638	173,510
1942.....	929,770	885,568	68,268
1941.....	863,955	857,471	24,066
1940.....	706,100	762,780	17,582
1939.....	538,198	598,972	65,995
1938.....	456,990	395,554	126,769

* Estimated by STEEL
American Zinc Institute

WITH SANDVIK SPECIALIZED SPRING STEELS

quality repeats itself...

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When your "specs" call for uniform gauge, finish and physicals, piece-after-piece, specify SANDVIK.

SANDVIK specialty high carbon and alloyed strip steels are supplied:

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- **Annealed, unannealed or hardened and tempered**
- **Precision-rolled in thicknesses from .001"**
- **With bright finish or polished bright, yellow or blue**
- **With round edges or square edges**
- **In a wide range of widths**

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SS-38

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WAREHOUSES: New York and Cleveland

Iron Ore

(Gross Tons—000 omitted)

	Consumption		Stocks at Lake Erie Docks and Furnaces	
	1948	1947	1948	1947
Jan.	7,057	7,024	29,081	30,514
Feb.	6,441	6,264	22,628	24,317
Mar.	6,634	6,979	16,022	17,411
Apr.	4,976	6,579	17,125	13,555
May	6,656	6,885	22,058	17,618
June	6,577	6,500	26,965	21,746
July	6,479	6,156	32,611	28,440
Aug.	7,036	6,638	37,081	33,896
Sept.	6,965	6,492	40,923	38,370
Oct.	7,398	7,151	43,833	41,641
Nov.	7,016	7,068	45,160	43,010
Dec.	....	6,970	.....	36,095
Total	....	80,807		

Annual Consumption—Gross Tons

1947	80,806,627	1943	89,027,689
1946	62,093,056	1942	86,225,460
1945	74,575,878	1941	76,335,682
1944	87,247,000	1940	62,426,314
		1939	44,361,289

Lake Superior Iron Ore Association

Fabricated Structural Steel

Orders placed—Tons

	1948	1947	Yearly Totals
Jan.	160,634	104,973	1947..1,628,756
Feb.	130,119	125,881	1946..1,726,057
Mar.	213,123	149,634	1945..1,392,608
Apr.	154,082	161,338	1944.. 786,096
May	141,764	112,954	1943.. 707,480
June	162,367	103,273	1942..1,762,453
July	174,682	153,540	1941..2,296,954
Aug.	166,051	146,382	1940..1,748,144
Sept.	174,671	134,630	1939..1,305,049
Oct.	161,758	159,132	1938..1,256,639
Nov.	138,343	132,916	1937..1,628,641
Dec.	.....	144,103	1936..1,609,016
			1929..3,597,825
Total	.....	1,628,756	

American Institute of Steel Construction

Fluorspar

1948—Net Tons

Qtrs	Production	Imports	Consumption	Stocks, end of period
1st	72,341	20,014	97,292	145,272
2nd	81,982	24,553	97,235	145,083
3rd	95,552	32,708	102,324	171,000
4th*	95,125	24,725	100,149	185,000
Total*	345,000	102,000	397,000	.....

Yearly Totals

	Production	Imports	Consumption	Stocks, end of period
1947..	343,700	78,379	376,138	147,251
1946..	277,300	29,488	303,190	117,620
1945..	325,200	100,726	356,090	123,011

* Estimated by STEEL
U. S. Bureau of Mines

Tin Stockpile

Office of Metals Reserve
(Long Tons)

1948	Receipts	Allocations	Stocks
Jan.	7,825	5,233	27,674
Feb.	5,269	5,083	27,086
Mar.	4,056	5,175	26,815
Apr.	6,113	5,010	27,956
May	9,609	5,055	32,437
June	8,318	4,994	35,701
July	6,332	4,821	37,118
Aug.	7,692	4,940	39,911
Sept.	7,457	4,892	41,575
Oct.	7,429	5,056	44,514
10 mos...	70,100	50,259	.....
1947			
Sept.	8,120	4,875	16,356
Oct.	8,967	4,690	21,309
Nov.	5,362	5,673	20,542
Dec.	9,466	5,716	24,555

Office of Domestic Commerce

U. S. Tin Smelter Output

(Long Tons)

	1948	1947	1946	1945	1944
Jan.	3,172	3,024	3,812	3,114	2,153
Feb.	2,800	2,815	3,823	3,162	2,419
Mar.	2,602	2,877	3,881	3,310	2,513
Apr.	2,906	2,816	3,891	3,407	2,611
May	3,310	3,112	3,904	3,451	2,402
June	3,650	2,712	3,856	3,502	2,479
July	3,509	2,517	3,853	3,548	2,618
Aug.	3,509	2,237	3,672	2,912	2,553
Sept.	2,859	2,356	3,323	3,323	2,501
Oct.	2,300	3,026	3,125	3,558	2,651
Nov.	2,907	2,759	3,119	3,628	2,852
Dec.	2,476*	3,041	3,209	3,676	2,907
Total	36,200*	33,292	43,468	40,591	30,619

Office of Domestic Commerce
* Estimated by STEEL

World Tin

(Long Tons)

	Production	Consumption	Stocks
1948	145,000*	140,000*	130,000*
1947	113,000	131,600	129,800
1946	90,000	116,000	113,000
1945	84,000	126,000	135,000
1944	97,400	121,000	125,300
1943	130,200	123,000	130,300
1942	107,900	146,000	126,600
1941	241,700	172,000	109,200
1940	235,500	160,000	61,000

International Tin Study Group
* Estimated by STEEL

Tungsten

U. S. Mines—Pounds

	Production	Shipments
1948	3,660,950*	3,061,366*
1947	3,026,470	2,944,622
1946	4,671,042	4,942,282
1945	5,388,639	5,266,818
1944	9,764,647	9,786,537

U. S. Bureau of Mines
* Estimated by STEEL

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International Graphite & Electrode Corp.

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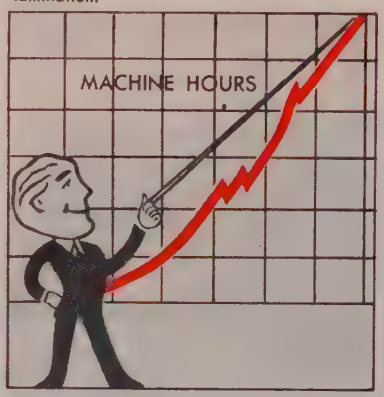

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STATISTICS

Foundry Equipment

Orders Placed for New Equipment
Indexes based on 1937-38-39 monthly average as 100%

	1948 Dollars	1948 Index	1947 Index	1946 Index
Jan.	1,432,489	380.9	466.9	391.1
Feb.	1,457,020	367.3	472.5	458.7
Mar.	1,414,401	326.2	532.3	576.7
Apr.	1,674,369	412.0	445.9	779.8
May	1,914,591	388.5	525.9	621.7
June	1,810,361	376.8	658.9	492.8
July	2,203,724	456.3	426.1	444.8
Aug.	1,573,033	324.7	411.3	555.5
Sept.	1,326,170	273.5	393.1	415.4
Oct.	1,460,707	296.0	438.2	407.1
Nov.	.....	....	286.1	421.0
Dec.	.....	....	467.8	379.0

Foundry Equip. Mfrs. Assn.

Gray Iron Castings

Shipments—Tons

	1948	1947	1946
Jan.	1,064,335	1,077,820	727,094
Feb.	1,024,450	1,009,970	571,894
Mar.	1,169,085	1,089,828	820,111
Apr.	1,051,083	1,097,150	885,701
May	992,692	1,097,307	782,850
June	1,072,040	1,038,356	757,268
July	914,464	912,939	840,004
Aug.	1,050,948	951,859	973,232
Sept.	1,088,051	1,025,089	937,401
Oct.	1,148,422	1,154,192	1,077,838
Nov.	.....	1,020,239	987,069
Dec.	.....	1,066,211	909,195
Total	..	12,540,960	10,269,657

1945 9,578,295 1944 9,794,541 1943 9,217,800

U. S. Bureau of the Census

Malleable Iron Castings

Shipments—Tons

	1948	1947	Yearly Totals	
Jan.	77,744	75,898	1947..	895,054
Feb.	75,194	74,683	1946..	752,028
Mar.	86,767	76,602	1945..	790,731
Apr.	80,602	81,890	1944..	878,233
May	76,079	75,488	1943..	844,639
June	81,747	78,524	1942..	746,008
July	64,995	64,162	1941..	832,173
Aug.	73,273	62,395	1940..	556,209
Sept.	77,824	71,568	1939..	466,068
Oct.	81,761	83,976	1938..	296,003
Nov.	.....	72,111	1937..	596,622
Dec.	.....	77,757	1936..	554,670
			1935..	455,208
Total	... .	895,054		

U. S. Bureau of the Census.

Steel Castings

Shipments for Sale—Tons

	1948	1947	Yearly Totals	
Jan.	108,282	101,140	1947	1,203,504
Feb.	107,762	92,822	1946	1,047,857
Mar.	125,550	99,701	1945	1,490,202
Apr.	114,896	106,127	1944	1,843,386
May	111,616	103,779	1943	1,928,645
June	117,794	103,888	1942	1,679,178
July	87,927	85,014	1941	1,316,027
Aug.	107,538	88,719	1940	797,947
Sept.	112,551	102,913	1939	594,147
Oct.	114,925	111,288	1938	342,737
Nov.	.....	97,143	1937	1,019,896
Dec.	.....	110,970	1936	805,691
			1935	398,988
Total	.....	1,203,504		

U. S. Bureau of the Census

Fuel Oil Consumption in Steel Industry

Gallons—000 omitted

	Melting Furnaces	Heating, Annealing Furnaces, etc.	Total
1947	1,511,945	655,883	2,167,828
1946	1,225,904	557,276	1,783,180
1945	1,402,527	606,130	2,008,657
1944	1,427,090	632,945	2,060,035
1943	1,472,540	636,885	2,109,425

American Iron & Steel Institute

Nonferrous Castings

luminum and Aluminum-base Alloy

(Shipments—Thousands of lb)

	1948	1947	1946
...	37,889	40,689	24,583
...	37,963	37,767	23,582
r. ...	41,794	42,266	27,944
...	38,269	41,669	29,703
y ...	33,868	37,400	31,208
e ...	35,822	32,986	30,855
y ...	28,944	30,197	31,159
g. ...	32,136	30,441	36,382
t. ...	35,877	35,877	34,563
...	35,542	40,532	43,007
v. ...	.....	34,683	38,229
...	.....	37,489	37,496

Annual Shipments (Thousands of lb)

7 ...	441,996	1944 ...	514,400
6 ...	388,711	1943 ...	459,535
5 ...	395,007	1942 ...	324,055

Copper and Copper-base Alloy

(Shipments—Thousands of lb)

	1948	1947	1946
...	85,432	101,776	84,555
...	87,169	92,566	74,851
r. ...	96,344	94,530	85,244
r. ...	89,035	98,253	91,365
y ...	81,286	90,054	89,163
e ...	84,817	84,604	83,160
y ...	71,803	70,603	79,379
g. ...	81,976	75,060	93,303
t. ...	86,973	83,158	92,367
t. ...	91,311	92,119	106,475
v. ...	.....	81,803	92,706
...	.....	87,215	93,028

Annual Shipments (Thousands of lb)

47	1,051,741	1944	1,446,200
46	1,065,596	1943	1,522,000
45	1,008,000	1942	1,365,800

Lead Die

(Shipments—Thousands of lb)

	1948	1947	1946
n. ...	1,303	1,195	838
b. ...	1,079	1,119	1,041
ar. ...	1,482	1,234	1,271
r. ...	1,219	1,383	1,133
ay ...	1,260	966	1,403
ne ...	1,183	1,079	1,227
ly ...	861	1,013	987
g. ...	1,120	1,000	1,264
pt. ...	1,420	1,241	1,228
t. ...	1,366	1,398	1,260
v. ...	....	1,205	1,020
c. ...	....	1,308	856
Total	....	14,136	13,528

Magnesium and Magnesium-base

(Shipments—Thousands of lb)

	1948	1947	1946	*1945
n.	659	864	453	10,424
eb.	655	768	497	10,366
ar.	704	717	627	12,646
pr.	673	634	607	11,903
ay	622	628	694	12,134
ne	709	613	756	10,565
ly	554	709	682	9,838
ug.	703	523	745	4,960
ept.	745	518	873	189
ct.	708	616	988	251
ov.	...	602	777	236
ec.	...	669	773	261

* 1945 shipments through August include incendiary bomb castings.

Annual Shipments (Thousands of lb)

947 ...	7,911	1944 ...	201,487
946 ...	8,472	1943 ...	143,326
945 ...	83,753	1942 ...	44,546

Zinc and Zinc-base Alloy

(Shipments—Thousands of lb)

	1948	1947	1946
an. ...	36,149	37,218	24,010
eb. ...	37,682	38,344	23,206
ar. ...	41,521	41,343	27,074
pr. ...	39,070	40,855	31,083
ay ...	35,469	36,772	32,323
une ...	37,136	33,890	31,839
uly ...	32,459	31,313	30,015
ug. ...	37,519	28,137	34,637
ept. ...	36,720	32,727	33,992
ct. ...	38,407	38,612	42,371
ov. ...	.....	33,617	37,291
ec. ...	.....	37,218	36,860
otal ...	.....	430,046	384,701

U. S. Bureau of the Census

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Model A

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Bobby Pins	Curtain Springs	Link Fabrics	Special Springs
Bonnets	Drapery Pin	Lock Springs	Spiral Binding
Bookbinders	Fish Hook	Mattresses	Stapling
Bottlecap	Fish Tape	Neeale	Stitching
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Button	Grape Tying	Piston Ring	Wire Cloth
	Gutter Broom	Plow Steel	

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FOSTORIA, OHIO — ESTABLISHED 1905

REPRESENTATIVES AND WAREHOUSES IN ALL PRINCIPAL CITIES

——STATISTICS——

Steel Forgings

Shipments For Sale—Tons

	1948	1947	1946
Jan.	118,534	116,074	92,177
Feb.	116,676	111,004	62,866
Mar.	131,111	115,456	87,478
Apr.	114,314	121,475	105,611
May	108,546	115,743	88,600
June	119,532	110,446	93,162
July	97,455	92,352	86,581
Aug.	111,097	98,009	108,424
Sept.	120,882	108,804	101,987
Oct.	123,161	123,830	118,697
Nov.	.....	103,740	108,112
Dec.	.....	116,798	110,346
Total	.....	1,333,731	1,164,041

U. S. Bureau of the Census

New Houses Started

Permanent Nonfarm Dwellings

	Number 1948	Number 1947	Estimated Cost (in thousands) 1948	Estimated Cost (in thousands) 1947
Jan.	52,600	39,300	$372,657	$223,577
Feb.	49,600	42,800	363,421	244,425
Mar.	75,100	56,000	551,382	340,261
Apr.	98,800	67,100	729,713	418,451
May	99,400	72,900	753,661	452,236
June	97,500	77,200	762,874	490,990
July	94,000	81,100	725,900	539,333
Aug.	83,000	86,300	675,654	589,470
Sept.	81,000	93,800	636,795	645,347
Oct.	72,000	94,000	559,896	678,687
Nov.	.....	79,700	.....	584,731
Dec.	.....	58,800	.....	435,290
Total	.....	849,000	.....	$5,642,795

Yearly Totals

	Number	Estimated Cost (in thousands)
1947	849,000	$5,642,798
1946	670,500	3,769,767
1944	141,800	495,054
1941	706,100	2,825,895
1933	93,000	285,446
1925	937,000	4,475,000

U. S. Bureau of Labor Statistics

Construction Valuation

37 States—Millions of Dollars

	Total 1948	Public Works Utilities 1948	Public Works Utilities 1947	Residential and Non-residential 1948	Residential and Non-residential 1947
Jan.	615.2	136.6	113.9	478.6	457.7
Feb.	682.0	177.3	90.5	504.6	351.6
Mar.	689.8	164.3	122.0	525.5	474.8
Apr.	873.9	184.7	161.4	689.2	441.0
May	970.8	205.0	252.9	765.8	490.0
June	935.2	215.7	185.7	719.5	419.4
July	962.7	217.9	165.9	744.8	494.4
Aug.	854.1	207.8	223.5	646.3	599.7
Sept.	762.2	202.7	141.5	559.5	508.4
Oct.	778.6	165.5	165.9	613.1	627.4
Nov.	611.2	106.9	181.5	504.3	533.6
Dec.	....	....	154.1	....	471.3
Total	....	....	1,958.8	....	5,869.3

Monthly Averages of Total Construction

1947	$652,312,000	1943	$272,833,000
1946	$624,144,000	1942	$687,922,000
1945	$274,942,000	1941	$500,623,000
1944	$166,168,000	1940	$333,663,000
		1939	$295,879,000

F. W. Dodge Corp.

Plumbing Fixtures

Shipments—Value in Dollars

Vitreous China and Glazed Earthenware

Qtr.	1948	1947	1946
1st	17,975,992	13,951,638	10,908,773
2nd	19,398,044	14,025,345	11,770,019
3rd	21,348,556	14,776,298	11,588,395
4th	.....	18,001,015	13,443,593
Total	.....	60,754,296	47,710,780

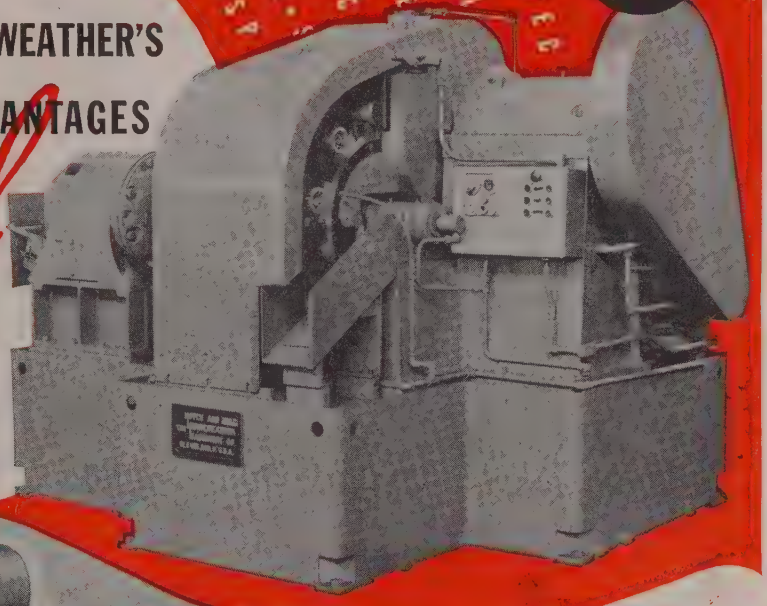
Metal

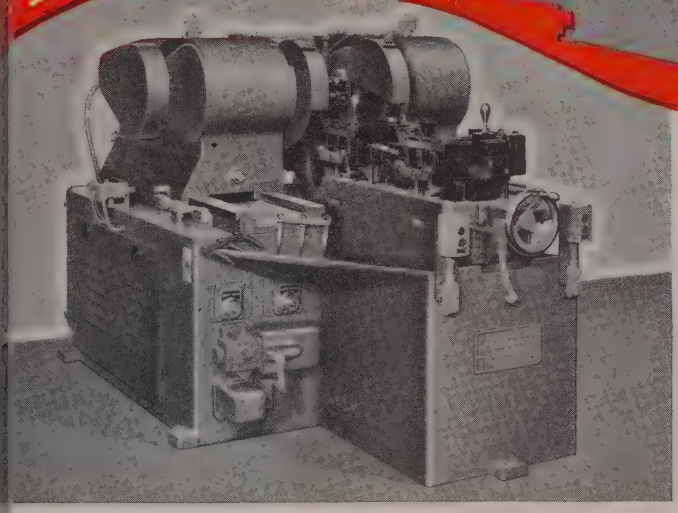
Qtr.	1948	1947	1946
1st	41,086,155	28,122,957	10,297,910
2nd	40,850,326	29,861,829	15,724,940
3rd	41,423,688	28,904,143	20,019,599
4th	.....	39,315,659	26,429,280
Total	.....	126,204,588	72,471,729

U. S. Bureau of the Census

You can get MOTCH & MERRYWEATHER'S TRIPLE-CHIP ADVANTAGES in *Special* CIRCULAR SAWING MACHINES

Triple-Chip METHOD





MOTCH & MERRYWEATHER SPECIAL PRODUCTION SAW MILLING MACHINE

Two Triple-Chip Saw Blades mounted in opposite planes automatically saw sprues and risers off cast aluminum bearings. Production is limited only by loading capacity.

MOTCH & MERRYWEATHER SPECIAL SAW MILLING MACHINE

No idle time! Saw-slot two forgings while loading two more. Similar variations can be developed for trimming ends of forging, removing gates and risers from castings, and other operations.

The five basic machines in the M. & M. line of circular sawing machines account for a surprisingly wide range of user needs—*but not all of them.* We are continually being asked to design adaptations and even new models which will "lick" unusual conditions. Two examples are shown.

All the features of the Triple-Chip method are preserved. You profit from record-breaking speeds, easy operation, accurate lengths, cuts smooth and square, burrless ends, minimum scrap, and savings in labor, floor space and overhead. Second operations are often cancelled out.

Only M. & M. builds ALL 3: CIRCULAR SAW, SAW BLADE, BLADE GRINDER

What, sir, are your requirements?

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING • CLEVELAND 13, OHIO

AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

Foundation for Safety

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FLOOR PLATE

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FREE

16 Page Catalog L-29. It's packed with useful information. Write now.

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FLOOR PLATES THAT GRIP

A Product of ALAN WOOD STEEL COMPANY

Other Products: Permaclad, Stainless Clad Steel • AW Super Grip, Abrasive Floor Plate • Billets • Plates • Sheets (alloy and special grades)

Standard-Size Ironers

Factory Sales—Units

	1948	1947	Yearly Totals	
Jan.	40,192	31,509	1947	599,258
Feb.	51,651	39,239	1946	124,616
Mar.	53,686	42,442	1945–43*	None
Apr.	47,319	51,409	1942*	66,090
May	44,954	51,685	1941	259,668
June	32,767	52,025	1940	175,466
July	26,679	41,911	1939	127,093
Aug.	35,203	47,577		
Sept.	37,308	53,277		
Oct.	38,517	58,605		
Nov.	.....	58,980		
Dec.	.....	70,599		

* Civilian production stopped from mid-1942 through 1945.

American Washer & Ironer Manufacturers' Association

Household Electric Ranges

Domestic Sales—Units

	1948	1947
Jan.	103,585	54,436
Feb.	103,506	60,568
Mar.	127,461	78,517
Apr.	104,677	81,731
May	98,983	87,637
June	123,300	96,271
July	83,485	78,749
Aug.	116,107	67,891
Sept.	128,829	99,519
Oct.	122,516	109,387
Nov.	.....	93,890
Dec.	.....	107,960

Yearly Totals			
1947	1,016,536	1946	542,168
	1939 296,846		

Data based on companies reporting to National Electrical Manufacturers Association

Household Gas Ranges

Production—Units

	1948	1947	Yearly Totals	
Jan.	210,865	203,268	1947	2,465,695
Feb.	223,756	188,387	1946	1,880,824
Mar.	252,036	203,631	1945	1,025,196
Apr.	247,403	210,406	1944	663,396
May	252,929	193,684	1943	360,612
June	259,675	202,954		
July	201,532	179,647		
Aug.	248,663	187,719		
Sept.	260,790	212,806		
Oct.	.....	261,221		
Nov.	.....	210,894		
Dec.	.....	211,078		

U. S. Bureau of the Census

Radio, Television Receivers

Number Produced

	1948 TV	1948 FM-AM	1948 AM
Jan.	30,001	136,015	1,173,240
Feb.	35,889	140,629	1,203,087
Mar.	52,137	161,135	1,420,113
Apr.	46,339	90,635	1,045,492
May	50,117	76,435	970,168
June	64,353	90,414	959,103
July	56,089	74,988	552,361
Aug.	64,953	110,879	759,165
Sept.	88,195	171,753	1,020,498
Oct.	95,216	170,086	869,086
Nov.	122,304	166,701	827,122

	1947 TV	1947 FM-AM	1947 AM
Jan.	5,437	51,318	1,507,416
Feb.	6,253	53,594	1,320,119
Mar.	6,639	67,264	1,303,366
Apr.	7,886	112,256	1,639,581
May	8,690	84,507	1,223,176
June	11,484	76,624	1,125,034
July	10,007	70,649	1,074,809
Aug.	12,283	72,014	1,181,538
Sept.	32,719	90,546	1,216,718
Oct.	23,693	151,244	1,827,366
Nov.	24,135	153,114	1,438,292
Dec.	29,345	191,974	1,484,596

Yearly Totals—All Sets			
1947	16,342,002	1937	8,083,141
1946	13,326,985	1936	8,248,753
1945*	300,000†	1935	6,030,508
1942*	4,306,984	1934	4,478,967
1941	13,642,334	1933	4,157,048
1940	11,831,187	1932	2,446,143
1939	10,762,631	1931	3,593,993
1938	7,141,811	1930	3,788,961

* Civilian production was curtailed from April, 1942, to December, 1945.

† Estimated.

Radio Manufacturers Association

Can you match these production figures?

THIS TRADE Verson MARK TRANSMAT PRESS

replaces 7 presses . . . frees 12 men for other jobs . . . automatically produces over 1000 coil containers per hour!

Verson TRANS MAT Presses open a whole new concept of metal forming — completely automatic production. The press illustrated and the accompanying close-ups indicate what can be done. .015″ strip is fed from a coil, blanked and deep drawn into ignition coil containers — 2.1″ in diameter and 4-47/64″ deep. Seven operations are performed without intermediate handling, annealing or pickling. Completed units are discharged at the rate of 1000 per hour.

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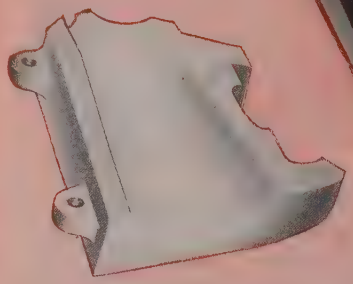

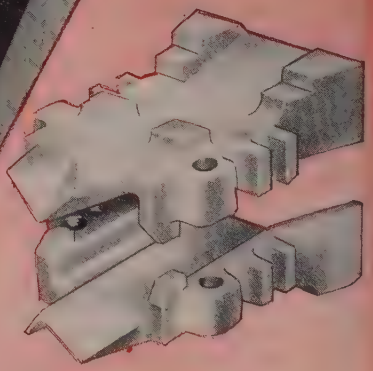

PRODUCTION · QUALITY · YIELD

YOUNGSTOWN ALLOY CASTING CORPORATION

YOUNGSTOWN 1, OHIO

STATISTICS

Washers

Sales Billed—Units

	1948	1947	1946
n.	360,445	259,233	116,131
b.	367,909	255,611	89,308
ar.	408,512	290,397	104,296
r.	402,257	320,969	166,129
ay	377,895	313,724	178,209
ne	392,496	314,705	172,195
ly	326,181	281,826	168,500
g.	362,169	279,229	189,778
pt.	433,919	354,094	184,215
t.	382,400	397,113	247,816
v.	.....	365,579	216,634
c.	.....	351,152	190,770

Monthly Averages

47	315,303	1940	129,389
46	168,665	1939	119,438
45–43*	None	1938	94,801
42†	80,233	1937	136,835
41	163,324	1936	144,095
	1935	117,813	

* Civilian production curtailed from July, 42, to December, 1945.
† January-June, 1942, average.
American Washer & Ironer Manufacturers' ssociation

Standard Vacuum Cleaners

Sales Billed—Units

	1948	1947	1946
n.	304,273	258,292	123,918
b.	311,448	272,927	121,000
ar.	355,415	321,515	140,166
pr.	306,588	330,426	159,558
ay	276,657	318,094	145,935
ne	256,071	329,986	178,841
ly	229,537	280,585	192,655
ug.	237,202	280,366	226,060
pt.	280,084	326,882	216,219
t.	281,573	358,546	259,153
ov.	255,080	350,470	260,572
ec.	.....	373,254	265,364

Monthly Averages

47	316,829	1940	111,716
46	190,787	1939	90,384
45–43*	None	1938	80,584
42	48,297	1937	100,849
41	139,177	1936	90,388
	1935	70,842	

* Civilian production curtailed from January, 43, to December, 1945.
Vacuum Cleaner Manufacturers' Association

Household Refrigerators

	Domestic Sales—Units		Monthly Average—Index
	1948	1947	1936=100
an.	272,121	196,855	1947 179*
eb.	281,580	169,450	1946 101.0
Mar.	338,109	230,672	1945–42† None
pr.	330,720	250,623	1941 183.0
Iay	317,763	263,785	1940 136.1
une	373,115	273,531	1939 92.6
uly	351,094	259,075	1938 62.0
ug.	281,345	199,001	1937 116.2
ept.	344,260	268,628	1936 100.0
ct.	.....	294,659	1935 77.1
ov.	.....	272,072	
ec.	.....	315,946	

* Estimated.
† Civilian production was stopped from 1942 hrough 1945.
Data based on companies reporting to Na- ional Electrical Manufacturers Association

Mechanical Stokers

Factory Sales—Number of Units

	1948		1947	
	Small*	Large*	Small*	Large*
an.	2,408	445	4,062	435
eb.	4,027	480	2,141	342
Mar.	4,812	527	3,425	453
Apr.	4,264	620	3,936	299
May	5,945	682	5,133	318
une	7,417	718	5,540	581
uly	7,956	842	6,637	836
Aug.	9,932	1,043	8,565	874
Sept.	13,009	1,148	9,284	922
Oct.	10,002	1,074	7,361	1,106
Nov.	....	....	3,329	607
Dec.	....	....	2,183	539
Total	....	....	61,596	7,312

Yearly Totals

Small*	Large*		Small*	Large*
946..181,223	9,695	1942..	79,062	8,938
945..119,079	11,745	1941..	182,956	9,491
944.. 31,603	11,355	1940..	144,758	8,067
943.. 17,765	15,074	1939..	96,245	8,044

* Small consists of classes 1 and 2 as de- ined by U. S. Bureau of the Census and large consists of classes 3, 4 and 5

INSPECTION SHEET No.000

INSPECTION SHEET No.000

Why Sprinkler Inspections Are All Important

YOU MAY HAVE the best sprinkler system available, but how sure are you of its readiness and ability to combat fire? After all, a sprinkler system, like any other mechanical device not properly maintained, may fail at its time of need. That could mean bad news to you, Mr. Property Owner. That's why you should know of the primary advantages of *"Automatic" Sprinkler* **Inspection Service.**

Realizing the vital importance of assured sprinkler system operation, *"Automatic" Sprinkler*, at the advent of its business some 55 years ago, established an **Inspection Service** Department. **Inspection Service,** which is handled only by individuals thoroughly familiar with all types of sprinkler equipments, actually augments periodic insurance bureau inspections and provides you with a double check on the general efficiency of your fire protection equipment.

Inspection Service detects minor irregularities and provides for correction before major repairs are necessary. It brings to your attention the need of extensions to your present equipment should property expansion so demand. In short, *"Automatic" Sprinkler* **Inspection Service** is an integral factor in every over-all fire safety program and its true value worth considerably more than is the small annual charge that is made for it.

Don't wait for fire to strike and then hope for the best. Be assured through **Inspection Service** that your fire protection will really protect, today—tomorrow—next week or whenever it is needed. "Automatic" Sprinkler Corporation of America, Youngstown 2, Ohio.

"Automatic" Sprinkler

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Easy, rapid and safe handling of heavy, bulky assemblies is "duck soup" for NORTHERN OVERHEAD ELECTRIC TRAVELLING CRANES which serve your fabricating department—to SHIFT or TURN assemblies to keep work areas in the most accessible, efficient position—to MOVE finished work to paint, to shipping—LABOR SERVING to save time cost!

★ Write for our Bulletin No. 126-C ★

OVERHEAD ELECTRIC CRANES AND HOISTS ★ NORTHERN ENGINEERING WORKS ★ 2615 Atwater St., Detroit 7, Mich.

STATISTICS

Warm Air Furnaces

Shipments

	1948 Number of units	1948 Value, in dollars	1947 Number of units	1947 Value, in dollars
Jan.	46,643	8,047,116	77,485	11,437,140
Feb.	36,354	6,022,809	66,554	10,261,525
Mar.	39,297	6,849,001	60,445	9,514,450
Apr.	45,600	7,808,803	55,661	9,646,572
May	55,473	9,289,770	55,630	9,864,499
June	64,724	10,893,354	55,518	10,305,553
July	57,292	10,095,721	57,608	9,864,395
Aug.	92,011	15,904,370	82,206	13,912,149
Sept.	103,405	18,325,993	91,050	15,072,661
Oct.	.....	.....	108,419	17,368,819
Nov.	.....	.....	72,640	12,666,085
Dec.	.....	.....	67,567	12,029,254
Total	.....	.....	850,783	141,943,102

	Number of units	Value, in dollars		Number of units	Value, in dollars
1947	850,783	141,943,102	1945	372,974	37,938,586
1946	699,058	88,016,228	1944	281,160	not available

U. S. Bureau of the Census

Oil Burners

Shipments—Units

	1948 Residential	1948 Commercial, Industrial	1947 Residential	1947 Commercial, Industrial
Jan.	36,262	2,683	73,766	4,232
Feb.	21,714	2,460	71,641	4,207
Mar.	15,929	2,290	86,372	4,352
Apr.	19,791	1,954	88,531	4,011
May	23,313	2,083	90,699	4,084
June	25,907	2,041	98,107	3,648
July	28,825	1,975	93,224	3,764
Aug.	47,592	2,490	113,274	4,011
Sept.	53,866	2,362	117,327	4,874
Oct.	.....	....	119,935	4,474
Nov.	.....	....	74,278	3,687
Dec.	.....	....	51,422	3,432
Total	.....	....	1,078,576	48,776

Yearly Totals

	Residential	Commercial, Industrial		Residential	Commercial, Industrial
1947	1,078,576	48,776	1940	247,663*	16,569
1946	499,009	37,306	1939	201,735*	13,295
1945	139,611	30,750	1938	129,323*	9,888
1944	45,752*	31,329	1937	177,675*	15,505
1943	27,956*	44,602	1936	182,130*	14,747
1942	82,357*	48,674	1935	126,820*	12,079
1941	271,673*	32,196	1934	89,097*	11,595

* Includes water heating units.
U. S. Bureau of the Census

Boilers, Radiators and Convectors

Shipments—1948

	Boilers Thousands of lb	Radiators Thousands of sq ft	Convectors Thousands of sq ft
Jan.	22,018	4,889	292
Feb.	18,660	4,840	170
Mar.	13,867	5,119	197
Apr.	19,699	4,570	224
May	19,752	4,866	257
June	15,953	4,857	371
July	18,005	3,889	226
Aug.	33,237	5,103	199
Sept.	31,343	5,190	285
Oct.	.....	....	...
Nov.	.....	....	...
Dec.	.....	....	...

Monthly Production Averages

	Boilers Thousands of lb	Radiation* Thousands of sq ft
1947	27,809	4,727
1946	20,710	3,186
1945	17,428	1,479
1944	18,183	1,449
1943	14,376	2,600
1942	14,736	5,000
1941	25,908	7,007
1940	23,654	6,421
1939	19,022	5,012

* Includes radiators and convectors.
U. S. Bureau of the Census

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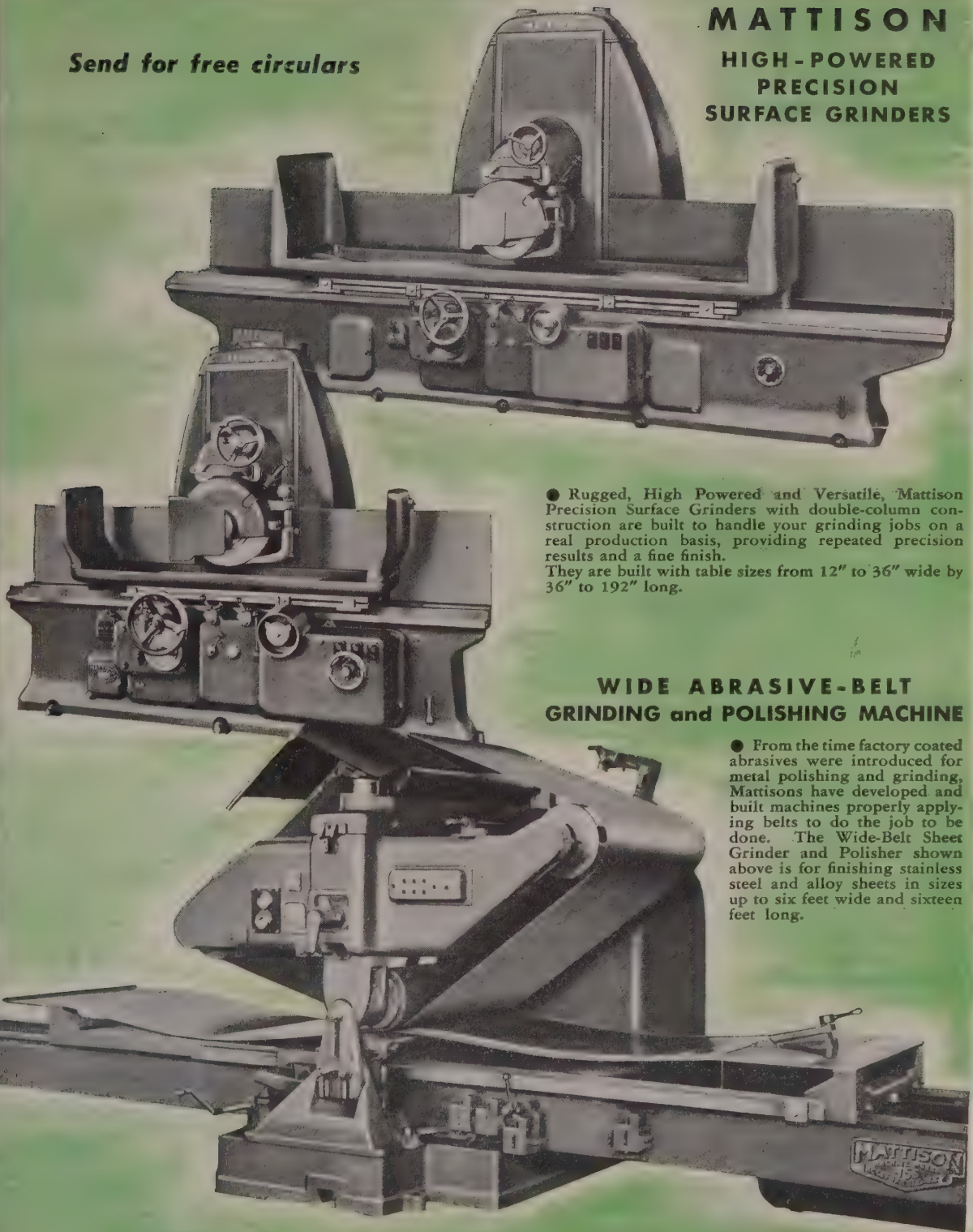
MATTISON

HIGH-POWERED PRECISION SURFACE GRINDERS



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They are built with table sizes from 12″ to 36″ wide by 36″ to 192″ long.

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● From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.

MATTISON MACHINE WORKS

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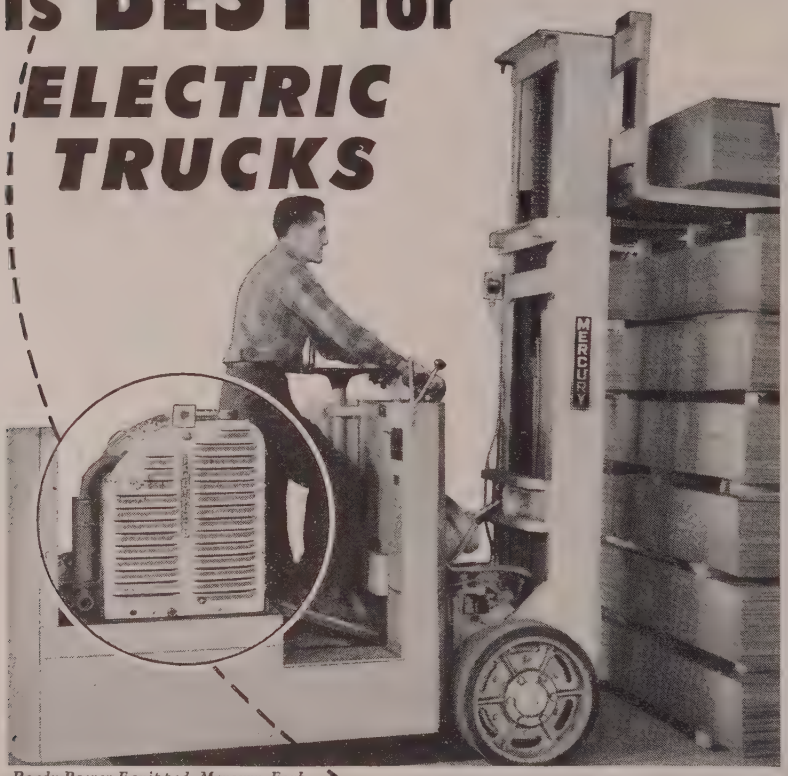
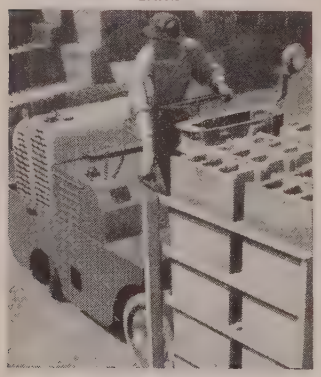


Ready-Power-Equipped Mercury Fork Truck



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BEST because Ready-Power Units are available to fit the specifications of any electric truck manufacturer and can be installed at your request.

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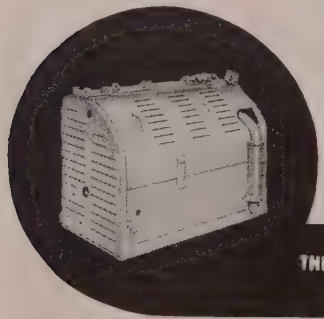


THE READY-POWER CO.

3824 Grand River Ave., Detroit 8, Michigan

Rail Freight Volume High

THREE FACTS stand out in the 1948 record of the railroads, accord- to William T. Faricy, president, Association of American Railroads, Washington.

First is that the railroads moved, with an all-time record efficiency, a freight traffic well above any pre-war year and only slightly below the 1947 peacetime record. Measured in tons of freight hauled one mile, this traffic approximated 640 billion ton-miles, only 2.3 per cent below 1947, but 43 per cent above 1929, the pre-war record year.

Second fact is that increases in costs since 1939 have been so much greater than increases in rates that even while handling this tremendous traffic with record efficiency, the railroads were able to earn barely 4¼ per cent on the net amount invested in them. Out of this return they must pay interest, rentals and other fixed charges, while out of what is left for the owners, a considerable part of the cost of providing improvements must be met.

Made Improvements—Third outstanding fact in the 1948 record is that the railroads spent $1¼ billion on improvements to their plant and additions to equipment. When final figures are in, it may well be that this, too, is an all time record for such expenditures made to increase the capacity and improve the service of the railroads to the public.

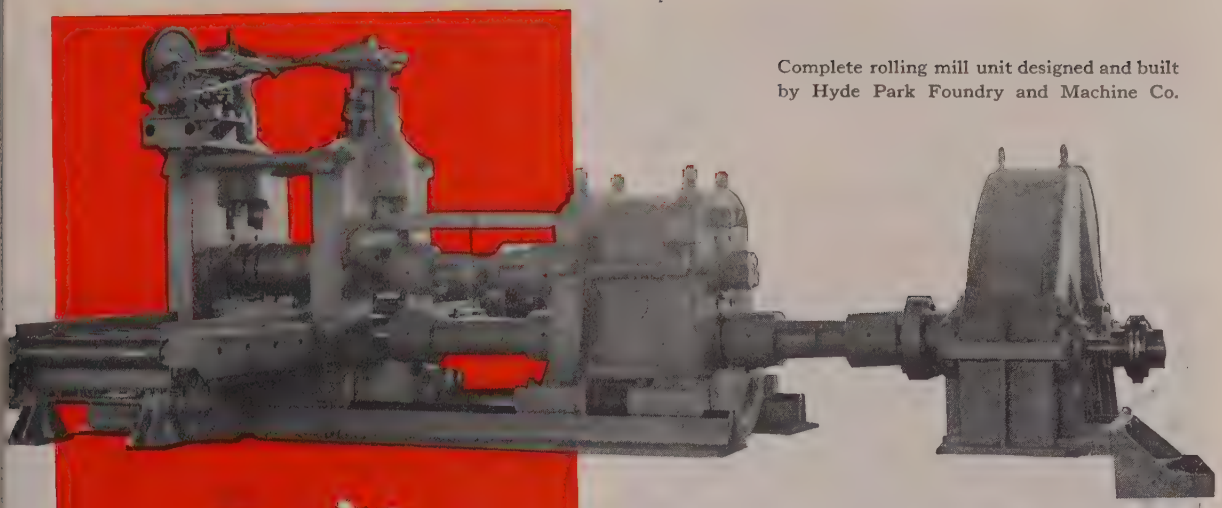
A major element in this program was installation during the year of more than 100,000 new freight cars, compared with 63,000 in 1947. Even with this increase in equipment there is continuing need for new cars, and the railroads have on order more than 100,000.

These additional freight cars are but part of the improvements programmed by the railroads for 1949. Preliminary reports indicate that this year, again, railroad investment in improved plant and equipment will exceed a billion dollars.

One important measure of the increasing efficiency of railroad operations is the fact that in 1948 they carried an average of 1,175 tons per freight train, greatest on record. At the same time, there was a slight increase in the average speed compared with the two preceding years, so that the net output of transportation per hour by the average freight train was greater than ever before.

GE Sets New Record

A RECORD - BREAKING million and a half horsepower in electric



Complete rolling mill unit designed and built by Hyde Park Foundry and Machine Co.

Hyde Park . . .

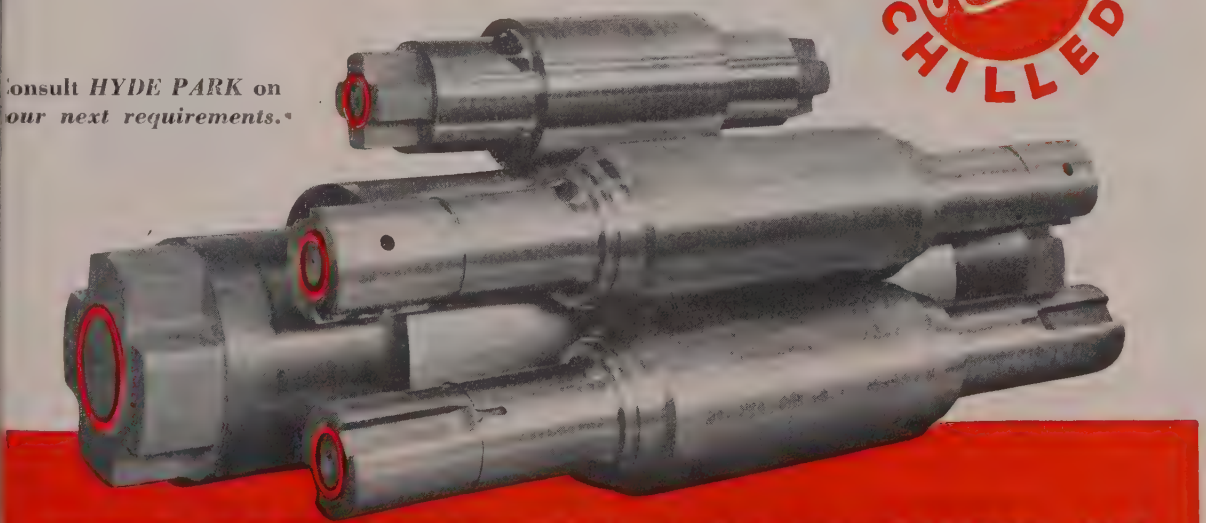
ROLLING MILL MACHINERY and CHILLED ROLLS

HYDE PARK Rolling Mill Machinery includes all kinds of Sheet and Tin Mill Shears, Roll Lathes, Steam Doublers, Sheet Pack Carriers, Stretcher Levellers and Rolling Mill Machinery built to specifications.

HYDE PARK produces the famed "Red Circle" heat treated Alloy and Plain Chilled Rolls for three and four-high Mills, Sheet and Tin Mills, Moly Rolls, Nickel Chilled, Grain Rolls, Cold Rolls and Sand Rolls.

RED CIRCLE Rolls CHILLED

Consult *HYDE PARK* on your next requirements.



HYDE PARK FOUNDRY AND MACHINE CO.

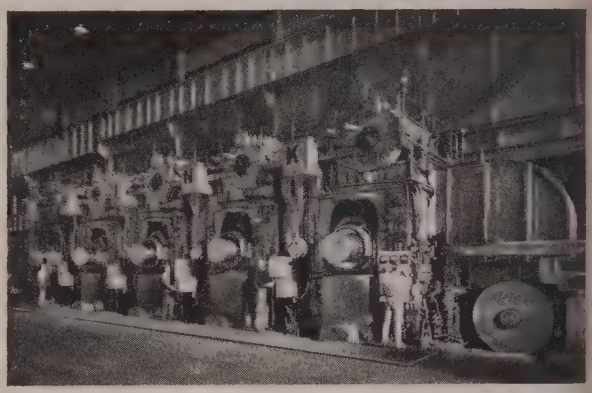
Hyde Park, Pa. (Pittsburgh District)

Torrington Bearings

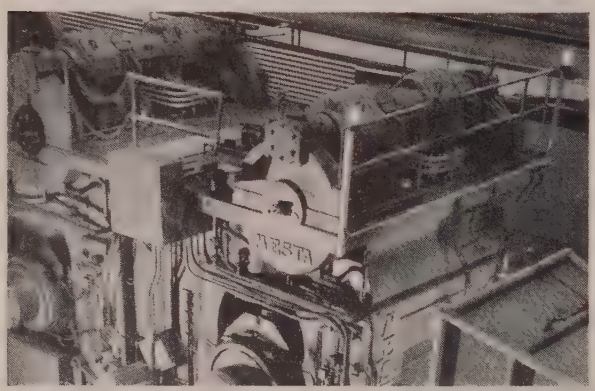
Put on the Pressure

in Record-breaking Steel Mill

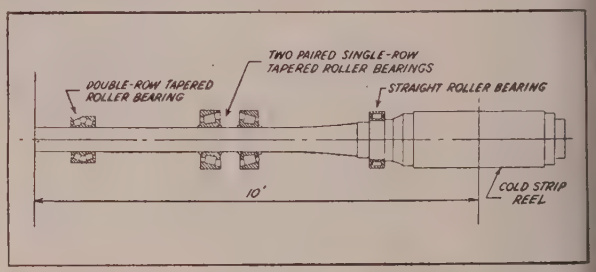
To roll strip fast is to roll it fine—in quality and uniformity. So, to make better strip, Mesta Machine Company designed and built the new Jones & Laughlin tandem strip mill for record speed—6,250 fpm. And it's equipped for top performance with Torrington Bearings on work rolls, screw downs and take-up reel.



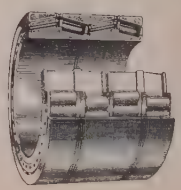
The pressure that reduces strip from 1/11" to 1/100" at *more than a mile a minute* imposes extreme loads on Work Roll Bearings. The design and high capacity of the Torrington four row Tapered Roller Bearings enable them to give exceptional service at this high speed despite tremendous radial and thrust loads.

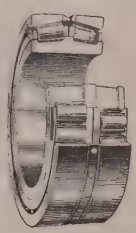


The mill screwdowns bear down on back-up rolls through Torrington heavy-duty Thrust Bearings, Type LR. The smooth operation and low starting torque of these bearings helps make the screwdowns the fastest in response action and the speediest ever installed on a tandem mill.



The take-up reel is of the mill-tested design shown here in cross-section, equipped with Torrington single and double-row Tapered Roller Bearings. Supporting the reel at one end only, the bearings are designed for maximum radial and thrust capacity to maintain high tension on the strip.





The exceptional service delivered by Torrington Bearings is based on our years of experience in designing, building and applying all major types of anti-friction bearings. For engineering assistance from design to maintenance, contact our nearest office. THE TORRINGTON COMPANY, South Bend 21, Ind., or Torrington, Conn. District offices and distributors in principal cities.

TORRINGTON TAPERED ROLLER **BEARINGS**

Spherical Roller • Tapered Roller • Straight Roller Needle • Ball • Needle Rollers

ansportation equipment was pro-ced in 1948 by General Electric o., Schenectady, N. Y. This repre-nts almost three times the amount stalled by the entire transportation dustry in an average prewar year, nd constitutes about 500,000 hp ore than G-E's record production in 947.

Units produced last year included bout 350 complete diesel-electric and ll-electric locomotives for domestic se. Many of the latter were mine ocomotives.

In addition to these, several hun-red electric equipments were built or Alco-GE diesel-electric locomo-ves.

In the urban transit field, approx-nately 910 equipments went into rolley coaches and modern street nd subway cars.

lew Equipment Developed

IGNIFICANT developments in its iversified equipment for the metal nd machinery fields have been an-ounced by Allis-Chalmers Mfg. Co., filwaukee.

These include new electrical con-rol devices for steel mills, a new line of small motors for driving fans, ompressors, pumps, machine tools nd similar equipment, a new auto-natic sheave, and a new self-prim-ng pump.

To measure roll screw-down set-ting accurately, the company re-ports a large southern mill is apply-ng the Allis-Chalmers dc positioner as a differential 20-in. dial indicator. The system operates from the dc supply driving the screw-down notors, thus preventing the indica-or from getting out of step in event of an interruption to the electric power supply.

Inching Control—A novel method of inching control, now applied by Allis-Chalmers, varies synchronous mill motors from zero up to a small fraction of full speed, permitting ac-curate and rapid positioning of mill rolls when replacing rolls. This new method eliminates "jogging." The same system is applicable for cement kilns, grinding mills or similar in-stallations.

An improved version of the auto-matic liquid rheostat has an elec-trode-positioning motor controlled by a generator set. For rolling mill ap-plication, this unit limits load to about 150 per cent. Other design changes include an improved, thermo-statically controlled heat exchange system for supplying cooling water only in quantities needed.

The new small motors ranging from ½ to 7½ horsepower are avail-able in totally-enclosed, non-ventila-

OK
SHEAR BLADES
are unequalled for
CLOSE TOLERANCE
UNIFORM HARDNESS
QUALITY STEEL
O. K. solid steel shear Blades made in three grades, suitable for all jobs . . . O. K. Bantle-Axe (High Carbon, High Chrome) for shearing up to and including ¼" mild steel or equivalent . . . O. K. Duro-Chrome for shearing hot or cold plate steel up to 1" mild steel or equivalent . . . O. K. Standard for average runs and heavy plate shearing.
Gang Slitter Knives made to same quality and specifications, precision ground to ± .0002 tolerances on thickness, diameter, or bore. Extremely high finish. Also hardened spacers.
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OHIO
THE OHIO KNIFE CO.
CINCINNATI 23, OHIO
13
Gentlemen: Please send me without obligation your new catalog with specific data on Slitter Knives, Spacers, Straight Blades.
COMPANY
NAME
ADDRESS
The
OHIO KNIFE
Co.
CINCINNATI, OHIO, U.S.A.

.020" Round Holes
in 28-Gauge Brass

2.5" Round Holes
in 15/16" Steel

On the same day, recently, Hendrick received orders requiring the punching of .020" round holes in 28-gauge brass and 2.5" round holes in 15/16" steel. This is typical of the range of perforations Hendrick is regularly called upon to furnish. When required perforations can even be made as large as 8" in diameter.

Hendrick is prepared to perforate to your specifications any suitable gauge of any commercially rolled metal, with any desired shape and size of opening. With over seventy years of experience in this work, Hendrick offers an unsurpassed stock of tools and dies, and ample plant facilities.

The Hendrick plant is also fully equipped to fabricate from perforated metal a wide range of products which involve such operations as shaping, forming, welding, riveting or brazing.

Write for detailed information.

SEE OUR CATALOG IN SWEET'S

HENDRICK
Manufacturing Company
30 DUNDAFF STREET, CARBONDALE, PENNA.
Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

ted and totally-enclosed, fan-cooled models in both standard and explosion-proof types.

Motion control in the wide-range vari-pitch type of v-belt sheave is offered by a new automatic sheave. Used with an ordinary sheave and a sliding motor base, the new sheave permits speed adjustment up to a 2:1 ratio while the drive is in motion. By means of a crank on the motor base, the motor is slid toward or away from the driven sheave.

A new self-priming pump features automatic air evacuation during the priming cycle. It is available in sizes from 1½ to 3 in. with capacities from 30 to 350 gallons per minute, heads up to 300 ft, and is especially designed for pumping light distillants.

New Pump Coupling— To facilitate pump assembly and disassembly, a new pump coupling has been devised which employs a tapered split-bushing principle, eliminating need for hammering, prying or wheel pullers in removing the coupling.

Developments in Allis-Chalmers electrical power distribution equipment applicable to the metal and machinery fields include a reduction up to 15 per cent in dimensions and weights of some power transformers in the 750-10,000 kva range, 66-kv and below. New bushing designs which permit assembly from standardized unit parts without cementing are available in some ratings up to 34.5 kv, thereby greatly simplifying field replacement of parts.

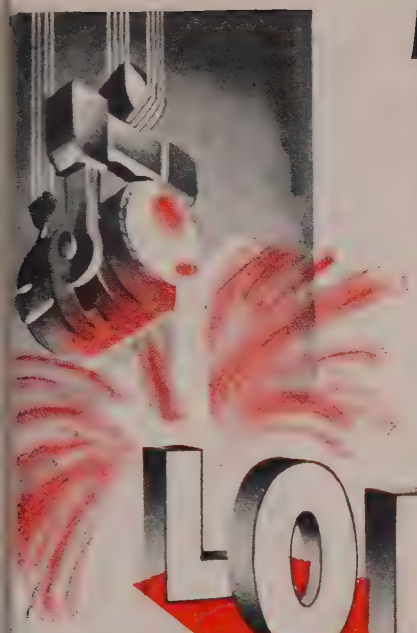
A new line of low voltage (600 v) current transformers was developed. Tests show the new transformer's ability to maintain accuracy at 60 per cent overload without overheating. A smaller and safer terminal board for indoor dry type current transformers was developed.

Gas Equipment Sets Records

GAS INDUSTRY executives see no limit to the expansion which gas appliance and equipment manufacturers and their dealers can attain.

Sales of gas ranges, gas refrigerators, gas water heaters and gas space heaters reached all time highs in 1947 and 1948. Despite these sales records, manufacturers, in many cases, were prevented from meeting demands and reaching higher sales and production saturations by lack of sufficient quantities of high grade enameling sheet steel and lack of steel pipe which prevented expansion of gas service into many new areas and into the growing, established markets.

With an increase of almost 20 per



It's Loftus All Along the Line

The Loftus organization designs and engineers complete plants and individual furnaces for the ferrous or non-ferrous industries—Every step along the way—From the Open Hearth to the Heating Furnaces for the final rolling —Then from the metal stock through the Heat Treating Lines. Loftus serves the metallurgical field from melting and refining to the finished heat treated product.

LOFTUS

Individual Furnaces or Complete Plants

•

ENGINEERED

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DESIGNED

•

CONSTRUCTED

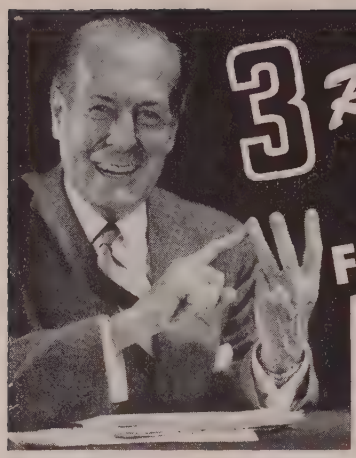
610 SMITHFIELD ST

LOFTUS ENGINEERING corporation

PITTSBURGH, PA.

Designers and Builders

Engineers, Consultants, Contractors



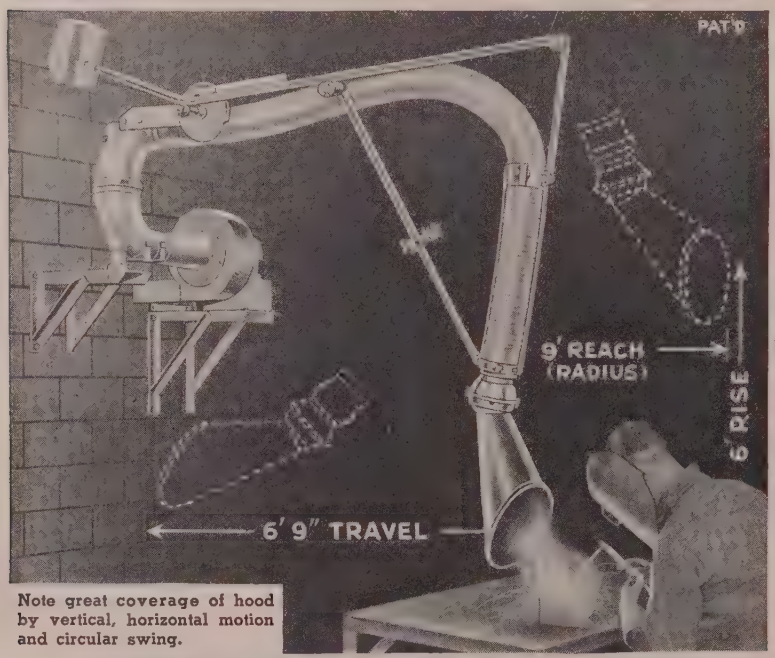
3 Reasons Why We Chose a RUEMELIN FUME COLLECTOR

There are 3 good reasons why we decided to install a RUEMELIN WELDING FUME COLLECTOR in our shop, after we saw it in operation. Like all of our equipment this measures up to the highest standards of dependable performance and maximum health protection because it is:

1. MORE EFFECTIVE — The powerful suction of the RUEMELIN FUME COLLECTOR efficiently draws out noxious gas, smoke and heat at the source. It provides great coverage, minimizes building heat loss, reduces welder's fatigue and guards employee's health — all to increase shop efficiency and output.

2. COMPLETELY FLEXIBLE — It is easily installed with least expense. When in operation, its hood instantly and conveniently adjusts for greater proximity to welding area without tedious adjusting devices.

3. UNIVERSALLY APPROVED — The RUEMELIN FUME COLLECTOR has the approval of state industrial commissions and compensation insurance companies. In addition it has the support of the thousands of users who have found their Ruemelin installations so satisfactory on the job.



Note great coverage of hood by vertical, horizontal motion and circular swing.

Standard Model D-5310 with hood reaching out 9 feet from wall. Also available in Long Reach Model D-5342 with hood reaching out 15 feet from wall.

For complete details write for Bulletin 37-C

RUEMELIN MFG. CO.

MANUFACTURERS AND ENGINEERS
SAND BLAST AND DUST COLLECTING EQUIPMENT
3882 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

A5490-⅔-R

cent over 1947, sales of residential gas ranges in 1948 attained an alltime high, 2,800,000 units. Automatic gas water heater sales totaled 1,500,000 in 1948; gas space heaters, 2,500,000 units; gas-fired central house heating (furnaces, boilers and conversion burners), almost 300,000 installations.

Growing acceptance of liquefied petroleum gas as an industrial fuel and for household use in territories outside the reach of gas mains is indicated by the growth in the number of customers who have installed lp-gas in their homes in the last ten years. Some 4,500,000 homes are using lp-gas today. Approximately 26 per cent of the 2,800,000 gas ranges sold in 1948 were for use with lp-gas. Automatic gas water heaters for lp-gas homes represented 12 per cent of 1948 sales. Correspondingly high percentages of other household appliances were for use with lp-gas.

All manufacturers agree that the "seller's" market is over and that increased and intensified consumer sales effort and training of retail salesmen will be necessary. However, gas industry executives expect 1949 sales of gas appliances to be far in excess of prewar averages (1936-1941).

Oil and Gas Steel Tonnage Up

MANUFACTURE of automobiles, diesel engines, tractors and heating furnaces, with expansion of the oil and gas industries to fuel them, has required more than one-fifth of the finished steel production since the end of the war, the American Iron & Steel Institute reports.

With the United States using more oil and natural gas than ever before, heavy demand for steel for production and marketing of these fuels is expected to continue.

In the first eight months of 1948, oil and gas received a tonnage of steel equal to 87 per cent of the total amount they received in all of 1947. The two industries appeared likely to receive more than 4 million tons in the full year 1948, a larger tonnage than ever before. Their share of total steel shipments exceeded 6 per cent in the first 8 months this year, against 5 per cent in 1947.

Shipments of steel pipe and tubes totaled 4,410,000 tons during the first eight months, an increase of 11 per cent over the record shipments of the first 8 months last year. Approximately 23,500 miles of pipelines have been placed in operation from the end of the war in 1945 through 1948.

At the start of this year, approxi-

ately 39,500,000 motor vehicles re in use in the United States. It expected output for the full year 48 would be more than 5 million hicles. Shipments of finished steel the automotive industry totaled ore than 23 million tons from the d of the war in 1945 through July of this year.

On the railroads, more than 5100 esel locomotives will be engaged in service by the end of 1948. Fifen years ago, no diesels were enged in road service. More than 0,000 tons of steel have gone into e diesel locomotives made in the st 15 years.

More than 2 million oil burners ve been made and shipped since e end of the war. Between three d four million are in service in the nited States, in addition to several illion portable or semi-portable aters. More than 2 million autoatic gas-fired heating systems are operation, in addition to another million gas-fired unit heaters and ace heaters.

More than 3 million tractors now re in use in the United States in griculture, and the use of non-solid els on farms has increased in many her ways.

More Steel Used in New Cars

EW models of popular postwar passenger cars require an average of out 200 lb more steel than late rewar models and up to 1000 lb ore than those in the early 1930s, he American Iron & Steel Institute eports.

The increased weight from year to ear of numerous makes has been especially pronounced among low-priced ars. In 1933 the three most popular ars had an average shipping weight f less than 2700 lb based on 4oor sedans. From 1933 to 1941 the eights of these cars rose steadily o an average of slightly more than 000 lb.

In 1946, average weights of the hree top selling cars in the lower rice field were substantially above 100 lb. Although weights were reuced slightly in some 1947 and 1948 odels, the average for the three reained higher than at any time prior o the war, and was 472 lb heavier han it was 15 years ago.

Although steel is only one of 30 or ore materials entering directly into onstruction of a car, it constitutes bout 69 per cent of completed car eight of a typical model. Including cast iron, the weight of iron and teel is 84 per cent of the total.

Streamlining of cars, following doption of the all-steel top, has been

TOP OPERATING EFFICIENCY
FOR at Reduced Maintenance Cost
PRODUCT IMPROVEMENT...
PLANT ENGINEERS RECOMMEND
Schmieg
DUST AND FUME CONTROL EQUIPMENT
Below is shown a 14000 CPM Centri-Merge Arrester Unit on a cast iron dust exhaust system.
CYANIDE FURNACES fume exhaust system is connected to a Centri-Merge Washer.
To Fit Both Plant and Product
Dust and fume control equipment correctly designed and manufactured is of vital importance to the safety and health of plant personnel, and results in product improvement. Schmieg engineers pioneered this principle of dust and fume control.
Plant engineers call upon Schmieg to design and build dust and fume control equipment to fit both plant and product. Typical installations by Schmieg include dust and dirt arresters, fume exhaust air washers, kerosene and welding fume exhaust units, stock and dust handling equipment in textile plants, cyclone collectors for brake lining dust, polishing and buffing dust collectors... to name just a few.
Schmieg dust and fume control units give you (1) reduced operating and maintenance expense, and (2) maximum efficiency in the removal of dust and fumes for improvement of working conditions and product quality.
DISC SANDING BOOTH Proper ventilation keeps dust from escaping to other parts of plant.
THE best AIR PURGE is CENTRI-MERGE
Our engineers will be pleased to consult with you in the solution of your problem
Schmieg INDUSTRIES INC.
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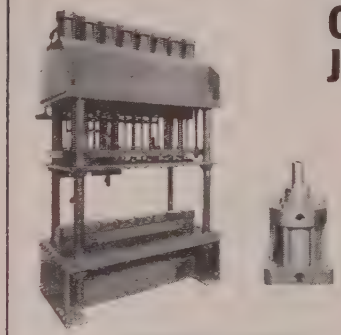
298 PIQUETTE AVENUE • DETROIT 2, MICHIGAN

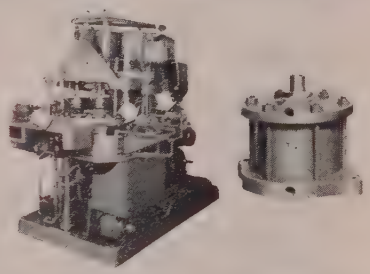
HERE'S HOW

T-J SAVES LABOR

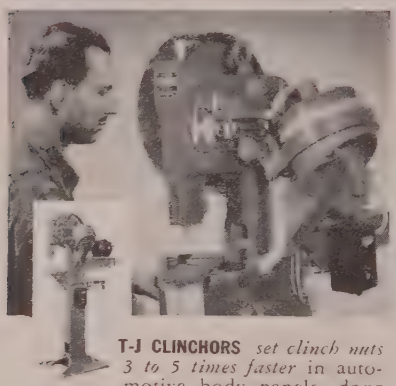
ON THOUSANDS OF JOBS FOR INDUSTRY!



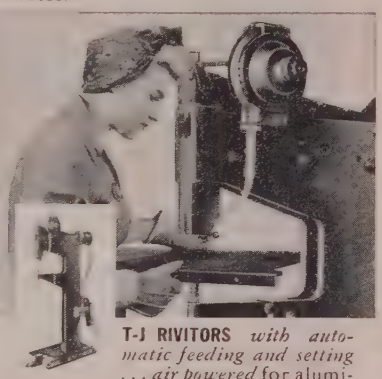
T-J HYDRAULIC CYLINDERS *simplify machines* . . . save time and labor on jobs where pushing, pulling or lifting is needed . . . 100 lb. or 50,000 lb. Shown here—a shell loading press with T-J Cylinders.



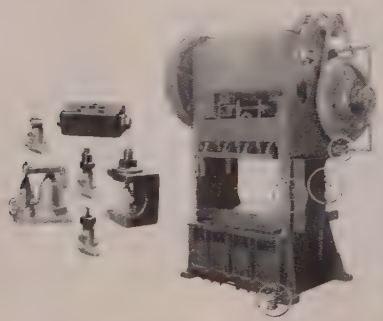
T-J AIR CYLINDERS *do push-pull-lift jobs* . . . 100 lb. to 12,000 lb. . . . wide range of styles, sizes and strokes. Shown here—Automatic Drilling and Threading Machine with T-J Cylinders.



T-J CLINCHORS *set clinch nuts 3 to 5 times faster* in automotive body panels, door locks, other products. Fully automatic —controlled by foot pedal.



T-J RIVITORS *with automatic feeding and setting . . . air powered* for aluminum alloy rivets 1/16" to 1/4" dia., up to 3. i" long. *Electrically powered* for solid steel rivets 1/16" to 1/4" dia., up to 7/8" long.



T-J CUTTERS *for more work between grinds* in tough die steels . . . accurate . . . sturdy . . . less breakage. All standard types and sizes.

T-J AIR CONTROLS *provide accurate, automatic control* for presses, brakes, other machines and equipment . . . designed for air cylinders in semi-automatic or automatic cycles.

Send for catalogs.
The Tomkins-Johnson Co.
Jackson, Michigan

T-J
TOMKINS-JOHNSON
RIVITORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

32 YEARS EXPERIENCE

a factor in the increased consumption of steel per automobile. Sheet and strip steel, accordingly, have been prominent parts of the rising steel content per unit. They account for approximately 74 per cent of the steel purchased for a typical passenger model.

In the opinion of automotive engineers, the weight of steel per car in relation to the finished or shipping weight per car has remained fairly constant since the 1930s. Any increase in the weight of a car these days obviously involves an increase in steel requirements.

Capital Investment Sets Record

EXPENDITURES by American business for the construction of new plants and purchase of new equipment are expected to reach a record total of $5 billion in the fourth quarter of 1948 and an estimated $4.4 billion will be expended in the first quarter of 1949, according to a joint report issued by Security and Exchange Commission and the Department of Commerce. Actual expenditures in the third quarter of this year aggregated $4.8 billion.

Both the dollar and physical volume of private capital investment in 1948 will be greater than in any other year on record. Expenditures for the year are estimated at $18.8 billion compared with $16.2 billion in 1947.

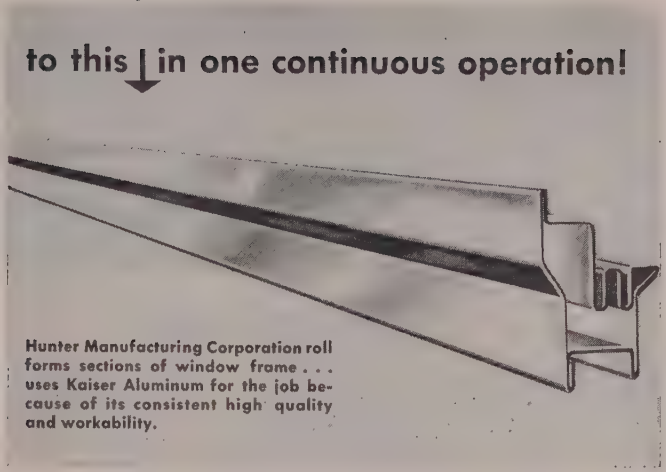
Cash Dividends Increase

CASH dividend disbursements by U.S. corporations amounted to approximately $207 million in November, 17 per cent higher than the corresponding month of 1947. These figures, compiled by the Office of Business Economics, Department of Commerce, include only publicly reported cash dividends which account for about 60 to 65 per cent of all gross cash dividends paid.

For the three-month period including November, manufacturing dividends rose 15 per cent over the corresponding period in 1947, with transportation and manufacturing increasing 44 and 38 per cent, respectively. Electrical machinery and oil refining rose over 30 per cent, while most of the other manufacturing groups registered increases of between 5 and 18 per cent.

Europe's Fuel Supply Better

STEEL production increase of 1 million tons in Europe over the first quarter of this year is believed pos



Hunter Manufacturing Corporation roll forms sections of window frame . . . uses Kaiser Aluminum for the job because of its consistent high quality and workability.

Mass produced from coiled sheet in *ONE CONTINUOUS OPERATION!*

OW? Hunter Manufacturing Corporation, Bristol, Pennsylvania, *roll forms* this tion of window frame from a Kaiser uminum alloy!

It's a typical example of low cost fabrition possible with the uniform high quality and workability of Kaiser Aluminum.

In this operation Kaiser Aluminum iled sheet is run through a 20-stand roll rming mill. Despite the severe forming one by these 20 rolls in a progressive operation, the completed section is produced straight lengths, free from cracks and her defects.

As the continuous formed piece emerges *at the rate of 75 feet per minute*—a traving shear cuts it to exact length for final sembly.

What does this mean to you?

In the manufacture of your product, erhaps some parts can be mass produced by roll forming with the proper alloy of Kaiser Aluminum. If so, chances are you can get these tangible, dollars-and-cents benefits: Lower unit cost—greater uniformity of finished parts—improved surface finish—simplified production scheduling and planning.

And—due to Kaiser Aluminum's *lightness*—you'll get lower handling and shipping costs, reduced worker fatigue, lower labor costs!

But most important, you'll get a better product with Kaiser Aluminum! A product that's strong and durable, that won't rust and that can't be matched for sales appeal.

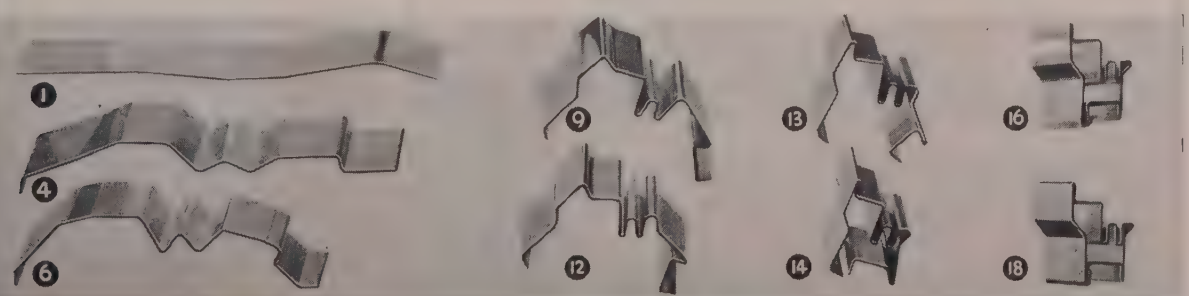
Whether your product is roll formed, spun, drawn, or fabricated by any other method, couldn't *you* lower costs by using the proper alloy of strong, versatile Kaiser Aluminum? Call in a Permanente engineer. He'll help you find the answer!

Permanente Metals

PRODUCERS OF

Kaiser Aluminum

SOLD BY PERMANENTE PRODUCTS COMPANY, KAISER BLDG., OAKLAND 12, CALIFORNIA: OFFICES IN MAJOR CITIES



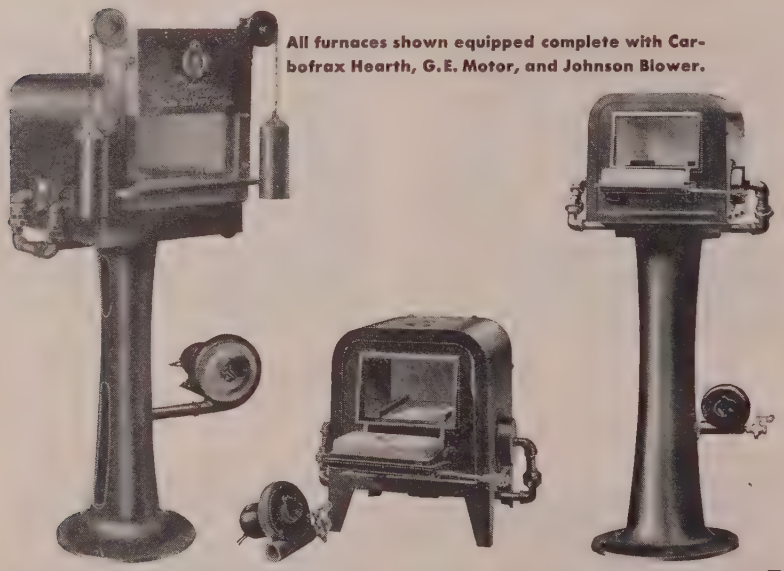
hese cross sections, taken from nine of the 20 stands of a roll forming ill, illustrate progressive stages of fabrication from Kaiser Aluminum coiled sheet to finished section. In one continuous operation an important part of a window frame is rapidly formed!

2300°F
1500°F
HIGH TEMPERATURE WHEN YOU WANT IT

QUICK ACTING

JOHNSON Hi-Speed HEAT TREATING FURNACES

Quick Acting JOHNSON Hi-Speed Furnaces permit quick, time-saving, cost cutting heat treating of dies, tools, and small metal parts. They are ideally suited for hardening high speed steels . . . equally efficient for high carbon steels, and for brazing carbide tipped tools. Powerful burners fire under Carbofrax hearth to produce high uniform temperatures FAST at remarkably low fuel cost. No time wasted waiting for warming up. Temperatures are easily controlled with accuracy. Write today for complete literature describing all *Quick Acting* JOHNSON Units. There is a size for every toolroom and shop.

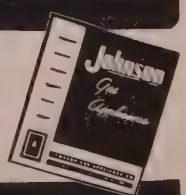


All furnaces shown equipped complete with Carbofrax Hearth, G.E. Motor, and Johnson Blower.

JOHNSON Hi-Speed No. 130A	JOHNSON Hi-Speed No. 70	JOHNSON Hi-Speed No. 120
4-Burner. 1400-2350°F. Firebox 7 x 13 x 16½.	2250° F. in 30 Minutes from a Cold Start. 2-Burner Firebox 5 x 7¾ x 9	1500° F. in 5 Minutes 2300° F. in 30 Minutes 2-Burner Firebox 5 x 7¾ x 13½
$295.00	$105.50	$145.50

PRICES F. O. B. FACTORY

JOHNSON GAS APPLIANCE CO.
573 E. AVENUE N.W., CEDAR RAPIDS, IOWA



COMPLETE JOHNSON CATALOG
Write for FREE Catalog describing all time saving, cost cutting JOHNSON Furnaces for pot hardening, melting, annealing, and heat treating purposes.

sible in the first quarter of 1949 as requirements of fuel for steelmaking will be met for the first time since the war, according to a report of the Coal Committee, United Nations Economic Commission for Europe.

The Coal Committee will notify the United States that the expected deficit between European coal supplies and requirements will be roughly 4.7 million tons for the new quarter, about 500,000 tons below the deficit for the fourth quarter of 1948 and an indication that it is a step toward ECE's goal of European self-sufficiency in coal.

Momentarily, at least, pressure has been taken off the European coal men who have been the targets of much of the criticism directed at Europe's creaking economy. If, however, other components of steel and plant capacity catch up with metallurgical coke, coal men may again find themselves in their former unenviable position. At the present time, coke production seems likely to keep well up with demand.

Yugoslavia received an allotment of 50,000 tons, her first from the UN committee, with the warning that statistical justification would have to be more complete in the future. The Yugoslavs have agreed to submit all the information required.

Place Large Diesel Order

DIESEL electric locomotive orders exceeding $18 million have been placed by New York Central Railroad and two affiliates for delivery in late 1949 and in the first half of 1950.

Bulk of the locomotives will be for freight service and will be constructed by Electromotive Division, General Motors Corp., Fairbanks Morse & Co. and Lima-Hamilton Corp.

Purchases cover seven 2000 hp road freight units, thirty 1500 hp road freight units, two 2000 hp transfer locomotives, fourteen 1500 hp road switching locomotives, five 1000 hp road switching locomotives, sixty one 1000 hp switching locomotives and four 2000 hp passenger locomotives.

These orders increase the Central's postwar improvement program to a total of $317 million which, according to Gustav Metzman, president, is the largest undertaken by any railroad. They will also bring the total diesel horsepower of the system to 948,600.

Blaw-Knox Gets Foreign Orders

BLAW-KNOX Co., Pittsburgh, has received two orders for rolling mill machinery, amounting in total t

You can depend on

PERATIONAL XPERIENCE"

esign-engineer of rolling mill equip- should know rolling practices and ms from A to Z. It's the *operational ex-* nce Lewis engineers possess that deter- the design of Lewis Rolling Mills and l machinery . . . Results—Simplicity, ctivity and Economy of maintenance.

elcome the opportunity to discuss ways neans of increasing your capacity rofits.

LEWIS MAKES

Cooling
—Gear • Pinion
-Coupling
gs—Rolling Mill ice
—Ferrous and errous Strip
rives
and Pinions— • Double Helical le Helical • Speed ction • Spur
g Pinion—Roll- ill
—Roll Turning
s—Roller for Plate Sheet
nery—Special • ng Mill • Rolling
nes—Pickling
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-Aluminum Foil • Billet and Bloom- Brass and Copper ld Rolling • Con- us • Edging • Four- • Single Stand • Reversing and Tandem • Merchant • Plate Rolling • Precision • Sheet and Strip • Slabbing • Three-High • Tin Plate • Universal • Wire • Zinc Strip • Roughing and Finishing
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Roll Ragging Attachments
Roll Polishers
Rolls—Alloy Iron • Chilled Iron • Sand and Chilled Iron • Steel
Saws—Hot and Cold
Screwdowns—Motor Operated • Hand Operated
Shears—Alligator • Bar • Billet • Bloom • Continuous Automatic • Sheet Mill • Gate or Guillotine • Lever • Plate • Power Driven • Scrap • Vertical
Straighteners—Angle • Bar • Rails and Shapes
Tables—Blooming Mill • Rolling Mill Feed • Transfer for Mills

EWIS FOUNDRY & MACHINE
Division of Blaw-Knox Co.
Pittsburgh, Pa.

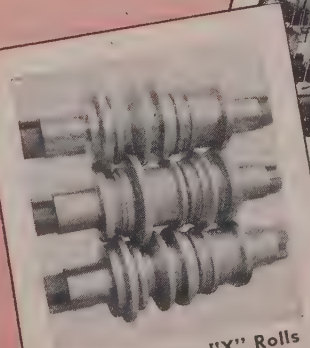
rs and Builders of Rolls and Rolling Mill Equipment

Setup Stands for
Lewis 17 Stand Rod Mill installation

Lewis Three-High Jump Mill and Tables

Lewis Bar and Structural Mill Stand

Lewis 17 Stand Rod Mill,
view at finishing end

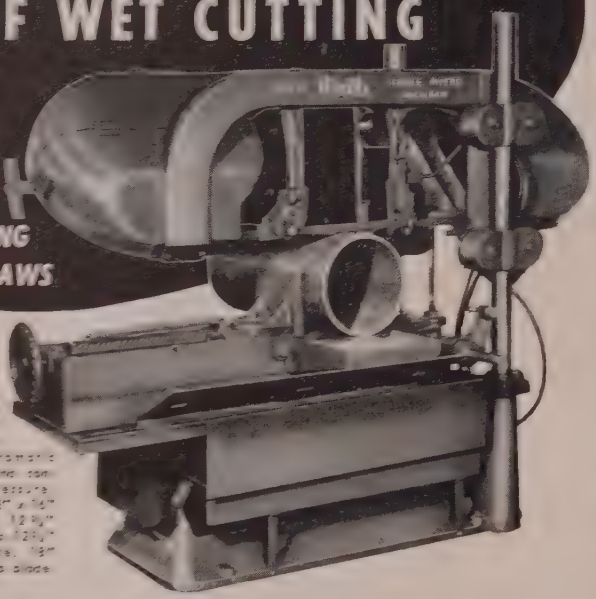


Lewis Superior "X" Rolls
(High Alloy Grain Type)

LEWIS ROLLING MILL EQUIPMENT

Now YOU CAN HAVE THE ADVANTAGES OF WET CUTTING

. . . with either of these popular WELLS METAL CUTTING BAND SAWS



Right—The heavy-duty Wells No. 12 with wet cutting system features an automatic cutting cycle and controlled blade pressure. Capacity is 12" x 14" rectangular or 12¾" round; die blocks 12½" deep, 16" wide, 13" clearance, bed to blade.

Left—The versatile Wells No. 8 with wet cutting system. Suitable for production or general utility. Capacity is 8" x 16" rectangular (5" x 24" with special guides); 8" rounds.

Both the No. 8 and the new No. 12 Wells Metal Cutting Band Saws are now offered with complete, self-contained Wells wet cutting systems. Experience gained through wide use of this system on the No. 8 saw has proven that it will pay for itself quickly thru production cost reductions. Controlled flow of liquid into cutting area increases blade efficiency and permits safe use of higher f.p.m. cutting speeds. Get full details on this economical extra today and ask about a wet cutting system for your present No. 8 or No. 12 Wells Saw.

Wells Saws

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

about $2 million, from the Union of South Africa and Argentina.

South African Iron & Steel Industrial Corp. Ltd. has contracted for engineering and construction of a complete rod mill at Pretoria. The installation will consist of a 20-stand mill and auxiliary equipment.

The other order is from the Argentine government. It calls for a rolling mill plant, to be located at Buenos Aires, equipped to roll aluminum, brass and copper.

Bath Buys War-Built Units

BATH Iron Works Corp., Bath, Me., has purchased from the government all shipbuilding facilities added to its plants during the war. These include a prefabricating plant and two ways.

The company will immediately spend $700,000 to extend the two ways just bought in order to build new-type destroyers, work on which is expected to start next summer.

Detroit Welding Conference Held

THREE-DAY conference on electric welding, sponsored by the American Institute of Electrical Engineers in co-operation with the Detroit sections of the American Welding Society, AIEE and the Industrial Electrical Engineering Society of Detroit, recently met in Detroit to hear some 29 technical papers covering the fundamentals of arc welding, inert atmosphere arc welding, three phase resistance welding, maintenance of resistance welding equipment, plant distribution systems for resistance welding power and the provision of power for resistance welding loads.

H. B. Wood of Duquesne Light Co., Pittsburgh, urged the users of resistance welders to consult with their utility companies before purchasing equipment so that no welder of such size or in such location as would involve prohibitive cost be installed. Major problems confronting the utility engineer in serving welding loads are: flicker to other customers on the same system; inadequate voltage; low revenue and high investment cost from fluctuating loads.

Develops Non-flammable Fluid

STANDARD Oil Co. of California has perfected, and will market immediately, a completely non-flammable aircraft hydraulic fluid. The material, it is claimed, will not ignite even though subjected to a 5000-degree flame.

The new fluid is designed for use

larger aircraft to eliminate a fire
ard arising from leaking fluid in
traulic landing gear mechanisms,
ht control surfaces and cabin su-
chargers.

Basic raw material of the fluid,
ich was perfected after two years'
earch, is a highly flammable pe-
leum gas which is converted, final-
into a non-flammable liquid. It
ains fluidity from 70 degrees below
o to 250 degrees above, is non-
rosive and lubricates at pressures
eeding 3000 pounds per square
h.

me Postal Rates May Go Up

CREASED postal rates on all
sses of mail except first-class will
asked of the next Congress, accord-
; to Postmaster General Donaldson.
special interest to business are
ntemplated increases on second-
ss mail including newspapers and
gazines; third class including cir-
lars and advertising; and fourth
ss, parcel post and special services
ch as money orders.

Sufficient increases will be sought
counterbalance the losses now be-
sustained on all classes of mail
cept first-class; the Post Office is
nfronted with the all-time record
ficit of $550 million as of next June
the close of the present fiscal
ar. The contemplated increases
e in addition to the increases au-
orized in Public Law 900—80th
ngress.

formative Booklets Available

HE following outstanding booklets
e available from private interests in
ashington:

From Chamber of Commerce of the
ited States: Legislative accom-
shments of the 80th Congress, first
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ecial session.

From National Planning Associa-
n: "The Guaranteed Annual Wage,"
report by Alexander Calder and
mes L. Knipe, of a formula by
ich "any well established company
n install a properly limited plan
stabilizing employees' annual
ges, but such plans might weaken
national economy if hastily taken
large doses."

Study Donora Smog Deaths

A FURTHER step in attempting
clear up the uncertainty surround-
the deaths of 19 persons during
vy 5-day smog at Donora, Pa.,
ently, the American Steel & Wire
has engaged the Kettering Lab-

● Horsburgh & Scott spur gears are rugged and dependable, built for industry's hardest tasks . . . they stand supreme in quality of materials and workmanship. You'll find proof in their performance and long, uninterrupted service.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 HAMILTON AVENUE • CLEVELAND 14, OHIO, U. S. A.

oratory of Applied Physiology in the College of Medicine, University of Cincinnati, to investigate in the area to determine what conditions contributed to the tragedy. The company operates a steel and wire manufacturing plant and a zinc works in the community.

The work of the Kettering Laboratory is concerned primarily with occupational hazards and diseases, their nature and significance, and the means of preventing them. During the 18 years of its existence, its staff has grown from 10 persons to over 50.

U.S. Steel Plant Program Pushed

UNITED States Steel stands on the threshold of another year with the expectation of bettering during 1949 its steel production record for 1948, which established a new high for any peace-time year, Irving S. Olds, chairman, board of directors, said in a yearend statement.

"United States Steel's record peacetime steel production and shipments during 1948 reflect in part completion of a substantial part of its large postwar program of additions and improvements to its facilities," Mr. Olds said. "This construction program will involve total expenditures of more than $900 million.

"Production figures speak more eloquently than theoretical capacity figures. The facts are that in 1948 the steel industry provided users with approximately 65 million tons of finished products, a considerably greater tonnage than in any other peacetime year. This record-breaking achievement in 1948 should be compared with shipments of 35 million in 1939, or with shipments of 46 million in 1940, when national defense and foreign military demands first appeared in noteworthy volume.

Major Improvements—"Major additions and improvements undertaken by subsidiaries of United States Steel can be summarized as follows:

"In the Pittsburgh district, major additions to sheet steel producing facilities have been completed at the Irvin Works of Carnegie-Illinois Steel Corp., and will improve this plant's ability to produce cold-rolled strip and other products. At the Vandergrift, Pa., Works two continuous coil-annealing lines, a 54-in. cold reduction mill, and a temper rolling mill have been installed to concentrate and facilitate production of silicon steels.

"A new continuous coating heavy gage galvanizing line was placed in operation at Irvin Works, and a similar line for production of light gage galvanized steel will be in operation there in a few months. At the company's Clairton, Pa., by-products coke plant, two batteries of coke ovens have been entirely rebuilt and a new additional battery constructed.

National Tube Expansion—"Marked progress has been made in construction of important new facilities of National Tube Co. at Gary, Ind., and Lorain, O. At Gary, the No. 2 seamless pipe mill has been modernized and rebuilt and is now in full production. At Lorain a new buttweld mill, three new batteries of by-product coke ovens, and a large, modern pipe warehouse have been completed. Under construction are soaking pits, a blooming mill, a revolutionary continuous seamless pipe mill and three bessemer converters, these facilities to be completed in 1949.

"In the Chicago district, 2 blast furnaces were completed to replace 2 smaller furnaces, adding substantially to the iron-producing capacity at the South Chicago Works of Carnegie-Illinois. At the Gary, Ind., Works, where No. 6 and No. 7 furnaces previously were enlarged, the company is enlarging the No. 4 furnace from 800-ton to 1500-ton daily

Your confidence in a stamping source is an item we can't buy—but *we can earn* it! You see, buyers of small to medium-large stampings across the nation have *solid reasons* for the trust they place in us—and we invite you to join this distinguished clientel. If your products require coining, as well as blanking, piercing, forming, drawing—or close tolerances—or are suitable for automatic or progressive press operations—we're sure you'll profit from an association in which you find

- **35 years of dependability, promises well-kept**
- **Broad experience, including extensive tool-engineering "know-how"**
- **Wide scope of production from a modern plant and equipment**
- **Cooperative material sources and devotion to quality and service**

Our new booklet "Stampings", describes our plant, over 75 presses and other equipment and the range of our production. Please write for your copy and the name of our Stampings Sales Representative in your area.

DETROIT STAMPING COMPANY
359 Midland Avenue — Detroit 3, Michigan

Manufacturers of famous De-Sta-Co Toggle Clamps, Arbor Spacers, Shim, Shim Stock, Blower Housings and Refrigerator Compressor Valves.

apacity, and additions of turbo blow-
s and other technological improve-
ents have substantially increased
ast furnace operations.

"A 4-stand tandem rolling mill was
ompleted at the Gary sheet and tin
ill of the company, with all neces-
ary auxiliary equipment. A battery
by-product ovens was installed at
ary Works.

"A stainless steel wire mill was
early completed at the Waukegan,
L., Works of American Steel & Wire
o.

Additions in South — "Extensive
odernization and additions to facili-
es have been completed or are close
completion at the Fairfield, Ala.,
Vorks of the Tennessee Coal, Iron &
ailroad Co., which include facilities
r production of cold-reduced sheet
ot heretofore produced by this com-
any. A new coal mine at Concord,
la., near Birmingham, also is near
ompletion.

"A research laboratory was
quipped and placed in use at Duluth,
Minn., by Oliver Iron Mining Co. A
ilot plant was installed at its Trout
ake Concentrator at Coleraine,
Minn., to improve and beneficiate
wer grade ores, and a new ore
ashing plant was placed in opera-
on at Mountain Iron, Minn., which
gether added 3,002,000 tons of iron
oncentrates to the ore produced by
liver last year.

"Additional steel producing facili-
es are under construction at the
merican Steel & Wire Co.'s Duluth
Vorks which will increase the annual
teel capacity of that plant by 35 per
ent. In Cleveland the company has
nstalled more cold rolling equipment
r highly specialized strip steel at its
uyahoga Works. At the Joliet, Ill.,
Vorks, the wire company has in-
talled additional capacity for the
roduction of intermediate sizes of
w carbon wire.

"Conversion of the plate mill of
he Geneva, Utah, plant of Geneva
teel Co. to production of hot-rolled
oils was virtually completed at the
ear end. Shipment of hot rolled
oils made at Geneva to Columbia
teel Co.'s new cold reduction sheet
nd tin plate mill at Pittsburg, Calif.,
ill begin in the first quarter of 1949.
he second phase of the Geneva con-
ersion, entailing rearrangement of
acilities in the plate finishing end
f the mill to provide for more ef-
cient handling and finishing of
late, will be undertaken in the near
uture.

"The new Columbia sheet and tin
late mill at Pittsburg, Calif., was
ormally opened in October and the
ite for another cold reduction sheet
ill of equal importance was acquired

O'NEAL STEEL

Announcing a Change in Names

Southern Steel Works

as of January 1, 1949, will be known as

O'NEAL STEEL WORKS

Fabricators of Structural Steel

Southern Steel Co.

as of January 1, 1949, will be known as

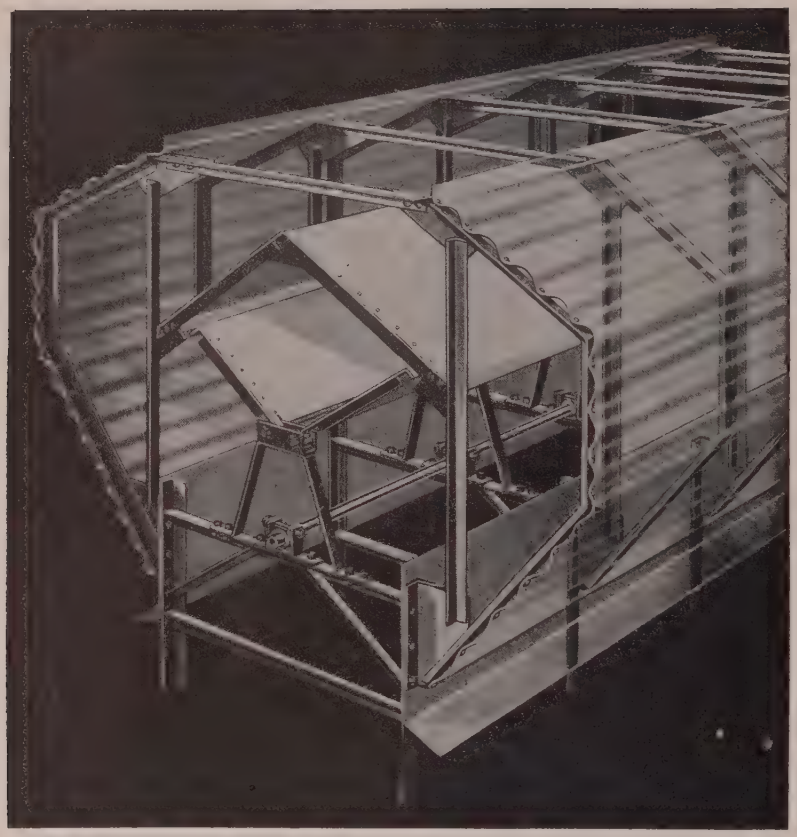
O'NEAL STEEL CO.

Warehouse Steel

NO Change in Management, in Policy, or in Service

KIRKMAN O'NEAL
President

745 North 41st Street
Birmingham, Alabama



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LETHARGY

WHEN DIRECT LABOR AVERAGES ALMOST ONE-THIRD* OF MANUFACTURING COSTS

Fresh air is your best assurance of active, "working" employees. Regardless of new machinery installations, your employees won't produce efficiently in a drowsy, or fume-laden atmosphere. Proper ventilation is a profitable investment.

The complete line of Burt Ventilators includes gravity, fan and continuous ridge types for almost any installation. With these standard models, a recommendation can be made that will serve your particular needs best.

Burt engineers, with a background of more than half a century of specialized ventilating experience, will be glad to submit recommendations on request—without obligation.

* A recent survey reveals direct labor costs run 5% to 60% of manufacturing costs. Average for all companies reporting was 32%.

SEE SWEET'S OR WRITE FOR CATALOG AND DATA SHEETS

The BURT MFG. Co.

905 S. High Street Akron 11, Ohio, U.S.A.

VENTILATORS · LOUVERS · OIL FILTERS · SHEET METAL SPECIALTIES

by Columbia in the Los Angeles area and work on this new mill is now in progress."

Tool Builders' Group Expands

MEMBERSHIP in the National Machine Tool Builders' Association, Cleveland, has been opened to producers of metal-forming machine tools. Heretofore, it has been limited to makers of metal-cutting machine tools.

In broadening eligibility rules the association defines a metal-forming machine tool as a power-driven machine, not portable by hand, used to press, forge, emboss, hammer, blank, or shear metal. Die casting machines, extruding machines, rolling mills or welding equipment are not included.

Electrodes Developed for Heavy Wear Parts

Parts receiving heavy wear on power shovels, crushers, mining machinery and handling and construction equipment may be hard faced with two new electrodes developed by Stoody Co., Whittier, Calif. Self-hardening 21 electrode is of fabricated construction, having alloys in tubes. Alloys include chromium, silicon, carbon and zirconium, amounting to about 21 per cent. Use of this electrode is for installations where there is a need for extreme abrasion resistance. Its melting point is 2300° F and its hardness is 53-56 rockwell C.

Electrode 1027, for impact strength applications, consists of a steel core wire with alloys contained in a heavy extruded graphitic coating. Alloys include chromium, manganese and carbon. Hardness is 45-49 rockwell C and the melting point is 2450° F. This type, as well as No. 21, can be used on both alternating and direct current welding machines.

Multioperation Machine Cuts Production Costs

Hourly production of 225 pieces is claimed for a new special machine developed by Cross Co. of Detroit for the drilling, countersinking and reaming of holes in the flanges of automobile rear axle shafts. Said to be capable of cutting production costs, the machine handles two pieces at each station. Independent floating work holding fixtures insure concentricity between the holes and pilot diameter.

It is a four-station, power operated, index table type machine with an independent loading station. At

e first station the flange is drilled ith five holes. Countersinking is erformed at the second station and eaming at the third. Flexibility for art design changes is provided rough the use of a standard Cross olumn and index table. Feed and apid traverse are hydraulically op- rated and control of the automatic ork cycle is by pushbutton.

New Materials Permit Component Size Reduction

Materials which have the unusual roperties which permit a consider- ble reduction in the physical size f electrical components such as in- uctors and transformers have been atented by Philips Laboratories Inc., rvington-on-Hudson, N. Y. The new agnetic ferrite materials were de- eloped by the laboratories of Philips o. in the Netherlands and will be anufactured and marketed in this ountry by North American Philips o. Inc. as Ferroxcube.

Consisting essentially of homoge- eous mixed crystals of metallic ox- des and iron oxide, the magnetic errites have high magnetic perme- bilities and low remanence and co- rcivity. In contrast with the usual agnetic materials which are highly onductive, the new materials are ssentially electrically insulating.

Properties of these materials make hem particularly adapted for high requency inductance coils, radio ransformers and other electromag- etic apparatus, the company states. Ferroxcube is being used as the 25 ilovolt transformer in a projection elevision system in which its size s only 1¾-inches in diameter and ⅛-inch thick.

Machine Drills, Faces Crankshaft Forgings

Rated at 47 pieces per hour at 80 per cent efficiency, a new special purpose machine faces and center drills the ends of crankshaft forgings. Built by Snyder Tool & Engineering Co., Detroit, the machine holds the forgings in the fixture by hydrau- lically actuated clamps after it is located manually. When cycle but- ton is pressed, the fixture table ad- vances rapidly toward the milling cut- ters and drops into feed. Both ends are faced to correct overall length.

Inserted carbide milling cutters are used by the machine at a speed of 350 feet per minute. Milling spin- dles are Timken bearing mounted. After facing, table returns to center- ing position and hydraulically actuat-

Whose Responsibility is SURFACE FINISH?

FIT AND FINISH are twin requirements for economical manufacture. To assure interchangeability of parts, the *fit* (i.e., size and tolerance) has properly been specified by engineering departments for many decades; but how about *finish?*

Until 20 years ago, surface finish could not be numerically specified or measured. Thus it was commonly left to the shop to provide a suitable finish. Inevitably there was no definite knowledge of the finish required for best performance of the product; and there was little regard on management's part for the methods and cost of obtaining the finish. Furthermore, since finish could not be measured numerically, this procedure often led to differences of opinion between everyone concerned, requiring costly executive time to decide on the acceptability of the finishes produced.

Since about ten years ago, when practical means became available for *measuring* surface roughness, hundreds of plants have studied the effects of finish on both product quality and production costs. These plants now specify and check the microinch finish on many surfaces, and get better products faster and at lower cost thereby—often with fewer operations.

To obtain these advantages, it is necessary to *specify* surface finish on working drawings and shop prints. The logical source of such specifications is the department which decides on *dimensional* specifications—namely, the engineering department. Once established and maintained in the shop, surface specifications result in substantial savings.

For checking surfaces in the shop, the Profilometer is ideal. It measures quickly, accurately, in definite microinch units, on practically all machined, ground and finished surfaces. May we give you complete information?

***Profilometer* is a registered trade name.**

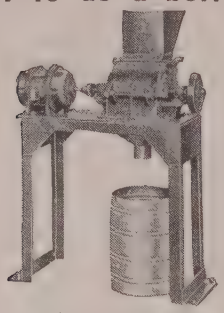
A SURFACE CONTROL INSTRUMENT BY

PHYSICISTS RESEARCH COMPANY

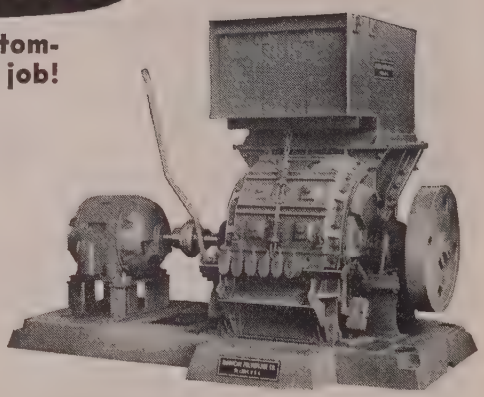
ANN ARBOR • MICHIGAN

from TEST GRINDING to TONNAGE CRUSHING

AMERICANS are custom-built to do a *better* job!



AMERICAN Laboratory Size Mills
With the same reduction action as Metal Turnings Crushers (or hammer action)—American Laboratory Size Mills offer an efficient means for reducing razor blades, pewter castings and fragile, thin brittle steel to a reclaim product.



AMERICAN Metal Turnings Crushers
Bulky, hard-to-handle turnings are rapidly reduced as much as 80% with this efficient, economical crusher. And the yield of cutting oil is increased 30 to 50 gallons per ton—proof of how profitable the installation of an American Metal Turnings Crusher can be for those who handle 20 tons or more of metal turnings a month.

There's a custom-built AMERICAN for your operation—write for further data and specifications.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1539 MACKLIND AVE.
ST. LOUIS 10, MO.

Music Spring Wire

Johnson Laboratory controls every step in wire production from raw material to finished product. Scientific chemical and physical analyses control quality, beginning with the selection of the best material for each product and carrying on with control of processing operations such as heat treating, die traction, special lubricants used in wire drawing.

JOHNSON
STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.

New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

ed quills carrying the centering tool spindles advance and drill centers in both ends of the forging, the tool speed being 60 feet per minute. Machine is adaptable to a wide range of part lengths and is fully adjustable in speeds and feeds.

Various Shaped Cans Made by New Machine

Fully automatic, the 101 bodymaker for use primarily for dry-package work or talcum type can that must be siftproof is capable of making square, rectangular, round or oval bodies, according to Hooven, Owens, Rentschler Co. Division of Lima-Hamilton Corp, Hamilton, O. Equipped with a beading attachment, the unit was designed for cans using a side seam. This built-in adjustable beader takes the can body after it is formed and makes one single bead around the entire circumference of the can near the top.

Also performed in the same operation is the starting of the top edge of the can inward for subsequent cover assembly, although it can be arranged for inward or outward flange, if desired. The machine can be converted for plain side seams. Sets of tools are provided for any size or shape desired within the capacities of the bodymaker.

Ice Freezing Floor Pipe Brazed by New Method

Full wall thickness and full strength of the pipe used in the ice freezing floor of Madison Square Garden, New York, were retained by the use of 3000 Easy-Flo brazed Flagg-Flow malleable iron fittings used to join the 20 and 40 foot lengths of pipe. The present floor, third in the building's history, required the laying of 13 miles of 1¼-inch galvanized wrought iron pipe placed on 4-inch centers over the entire arena floor.

Leak-tight joints were obtained between pipe and fittings by sweating in the high strength silver brazing alloy with oxyacetylene torches, a process using Easy-Flo silver brazing alloy developed by Handy & Harman, New York. Continuous testing of the joints was carried on, both during fabrication and after completion. A test under 100 pounds air pressure followed by hydrostatic pressure tests of 100 pounds, more than twice normal working pressure, disclosed a very low percentage of "leakers." These were repaired by reheating and applying a small additional amount of the brazing alloy.

LETTERS *to the Editors...*

Scrap Recovery

Several years ago you ran an article on the Heckett Engineering Co. and the Holland Engineering Co. pertaining to the reclaiming of scrap steel from steel mill and foundry slag dumps. We would certainly appreciate it if you could arrange to mail us a copy of this issue.

Joseph B. Horwitz, Treasurer
Alvin Naiman Wrecking Co.
724 Rockefeller Building
Cleveland, O.

The article appeared in STEEL, Feb. 8, 1943. Tear sheets are being sent.—The Editors

Forging Articles

I have been following with interest your articles on "Fundamentals of Forging Practice" which have appeared intermittently. They have proven very enlightening to me because of the very clear manner the various operations were described. The illustrations, too, made the articles a real good source of gaining knowledge.

We have two plants in our division, an upset plant and a drop forge plant, and because I have had these articles taken from our magazines, no one but myself had the opportunity to see them. May I make a request that a few booklets—say six or eight—be sent us so that I can distribute them among our supervisors.

R. T. Crocombe,
Assistant to the Vice President
American Forge Division
American Brake Shoe Co.
Chicago, Ill.

This series has proved so popular that all of our tear sheets are gone. We plan to assemble these articles in the form of a book to be published shortly.—The Editors

Want Six More

Many thanks for your letter, together with the reprint of the material on steel selection. I have turned this over to our Engineering Department. The men value the book so much that they want six more copies.

Fred W. Pennington, Manager
Publications & Advertising
Kennametal Inc.,
Latrobe, Pa.

Your six copies are in the mail. Our Readers' Service Department still has a limited number available at $1.00 per copy.—The Editors

Take A Bow Dept.

With great interest we have noted the articles on "Fundamentals of Forging Practice," by Waldemar Naujoks. We are wondering if it would be possible for you to tell us with whom Mr. Naujoks is associated and to which address mail may be addressed to him as we are interested in congratulating him on his excellent writings.

M. P. Rudis
Rockwell Engineering Co.
13500 South Western Avenue
Blue Island, Ill.

Mr. Naujoks can be reached at 408 Highland Avenue, Wadsworth, O.—The Editors

Shot Peening Article

We wish to thank you for sending us the six copies of the shot peening article written by Mr. Zimmerli. These were received today and are appreciated greatly.

A. B. Bigelow, Secretary
Alloy Metal Abrasive Co.
311 West Huron Street
Ann Arbor, Mich.

The article, "Shot Quality—How It Affects Fatigue Life," by F. P. Zimmerli of Barnes-Gibson-Raymond Division of Associated Spring Corp., Detroit, appeared in STEEL for Oct. 18, 1948.—The Editors

Reprints Forwarded

Are reprints available on the article "Steel Industry Statistics" which appeared on pages 39 to 54 of your November 29 issue? It would be quite helpful if you could furnish a copy of this material.

A. L. Thurman
Aetna-Standard Engineering Co.
Youngstown, O.

Reprints are available from STEEL's Readers' Service Department gratis, the only charge being for large quantities.—The Editors

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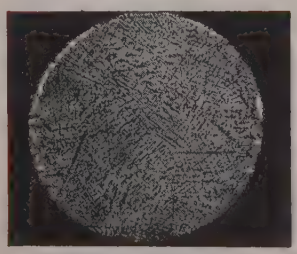


MICROSCOPIC STRUCTURE OF METAL

Book Covers Scissors History and Development

Two-bladed cutting implements dating from the third century B. C. to the present are covered in "A Story of Scissors and Shears," a book concerned exclusively with their history and development. It is published by J. Wiss & Sons Co., Newark, N. J., in commemoration of the founding of that company 100 years ago.

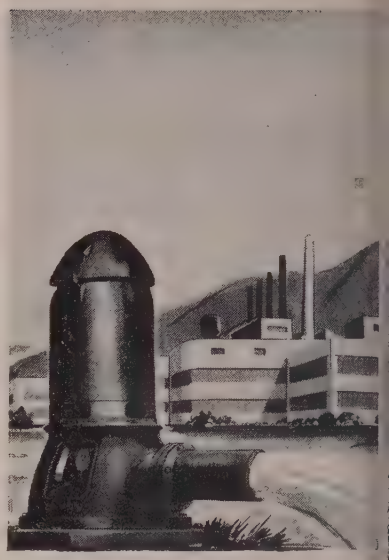
The first pair of shears originated in the third century B. C., science having traced their inventors to the Italian shepherds of that period. Greek, Roman and Egyptian shears had a bow spring back with thin, hardened blades working against each other under the pressure of the hand. Cross-bladed shears with a center pivot are attributed to the first century.

Methods and techniques of manufacture and the necessity for individual craftsmanship are covered in detail. The founding of the Wiss Co. by Jacob Wiss, a cutler and gunsmith from Switzerland is mentioned, he having started working for a company which he later bought out. Development of various types of shears and scissors is explained chronologically. Some 40 illustrations picture the development of the company and its products.

Lighting Units of Porcelain Enamel Recommended

Twelve of fourteen industrial units with quality standards established by RLM Standards Institute, Chicago, have enameled steel reflectors which, according to the institute, must meet rigid specifications for thickness, reflection factor and durability. These specifications are outlined in the RLM specifications booklet, published by the institute to acquaint all who are interested in the purchase, specification or installation of industrial lighting equipment, with the importance of the quality standards established to insure efficient and economical lighting.

Porcelain is said to be particularly suited for industrial lighting units due to its resistance to corrosion, deterioration, industrial and atmospheric conditions and loss of efficiency. It also has a high light reflection and diffusion factor. According to the institute, porcelain enamel is but one of the many factors which should be considered in the specification of lighting equipment, the others being brought forth in the booklet, available without charge from its publications office.



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New England Area Products Listed

Directory of New England Manufacturers—1949, cloth, 756 pages, 8 11 inches; issued with editorial cooperation of the New England Council; published by George D. Hall Co., Boston, Mass., for $30.00.

Thirteenth annual edition of this volume contains a wealth of information about manufacturers, their products, personnel, etc., in the New England area. The New England Council, which co-operated in the publishing of the book, is composed of representatives of the agricultural, commercial and industrial associations of the six states in the area. It acts under the auspices of the New England governors.

Specific sections of the book cover lists of manufacturers' associations, chief industries of the area, New England members of the 80th Congress, international trade problems, engineering societies of New England and information on the organization, purpose and officers of the council. Information on manufacturers is contained in six sections: Catalog; alphabetical, giving name of company, address, other locations, names of officers, partners or proprietor; geographical, giving manufacturers listed by city or town, along with description of products; product, listing manufacturers under products made; product section, index of classifications; brand name, containing a listing of brand and registered trade mark names.

Turning, Boring Practice Guide Published

Turning and Boring Practice, by Fred H. Colvin, editor emeritus, *American Machinist,* and Frank A. Stanley, formerly editor, *Western Machinery and Steel World;* cloth, 31 pages, 6¼ x 9¼ inches; published by McGraw-Hill Book Co. Inc., New York, for $4.75.

Essential principles and major problems involved in the different operations and a description of the more important varieties of machines and methods of operating them are presented in the third edition of the book. Included are data on speeds and feeds, new cutting alloys and materials and use of coolants. Added is information in various sections on mandrel and taper work in lathes, on precision boring where extreme accuracy is required, on boring bars for special work and new data on carbide tools for different classes of work.

Found in the book are such topics as large boring operations, boring

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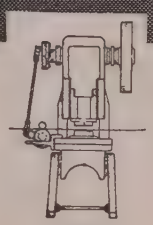

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FASTER feeding, greater accuracy, improved quality—with Littell press-room equipment. One example, the Littell new-style Continuous Straightening Machine shown. Mounted on fully enclosed steel base, portable, control arms for regulating loop of stock. Pinch rolls 3½" dia. by 8½" long for stock up to 8" wide. Other units for wider stock. Standard speed, 10' to 60' per min. Floor space, 17" x 36". Littell No. 3 Automatic Centering Reel shown, capacity 300 lbs. Littell also makes other press-room units.

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and threading in a lathe, three ways to turn contours, turning and boring plastics and machining aluminum. The 24 chapters of the profusely illustrated book fall into five sections entitled: Lathes (in general), turret and semiautomatic lathes, automatic screw machines, boring machines and cutting tools for different materials.

Book on Taft-Hartley Act Revised

Operating Under the Taft-Hartley Act, by Max Malin and S. Herbert Unterberger; paper, 58 pages, 8½ x 11 inches; published by Labor Relations Information Bureau, Washington 1, D. C., for $2.00.

With the law being studied for its effect on collective bargaining, this revised and enlarged edition of the book directs its attention to everyday labor relations situations and explains the full impact of the law on them. For each situation, it pulls together all the related points regardless of where they are found—in the various sections of the statute, in regulations of the NLRB, in court decisions or in legislative materials. The book explains, step-by-step, how the law works in these situations.

Integrated into the text of the new edition are the results of administrative and judicial decisions rendered since the act was passed. An additional chapter provides a summary of the trend of federal labor legislation including a description of the types of proposals which the next Congress will have to face.

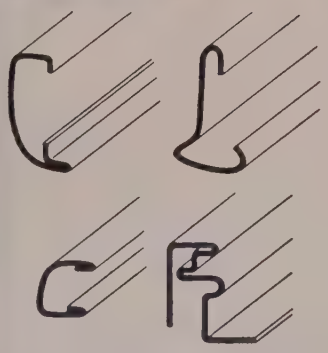
Covers Applications of Metallography Principles

Principles of Metallography, by Robert S. Williams, professor emeritus of physical metallurgy, and Victor O. Homerberg, professor of physical metallurgy, Massachusetts Institute of Technology; cloth, 6¼ x 9¼ inches, 319 pages; published by McGraw-Hill Book Co., New York, for $4.00.

In this, the fifth edition of this book, the authors adhere to their original purpose of meeting the needs of those students of general science or engineering who do not intend to specialize in metallography, but who expect to use it in connection with their professional work. Greater emphasis is laid on the applications of metallography than on the physicochemical principles involved.

Changes in this edition over the previous one include: Rearrangement and addition of new materials in the section dealing with copper alloys; rewriting and enlarging the magnesium alloy section; addition of new

ROLLS



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material on aluminum alloys, alloy steels, cast irons and case hardenings; section on hardening and tempering of steel is expanded; and a discussion of hardenability has been added.

Sections on the simple alloy diagram and its meaning, the plastic deformation and annealing of metals, the nonferrous alloys of technical importance, iron and steel, the macroscopic examination of steel and laboratory methods are contained in the book.

Labor-Management Discussed in Pamphlets

Methods and techniques of improving labor-management communications through employee opinion polls, employee publications, motion pictures, devices for management-worker co-operation and employee education in company economics are discussed in four pamphlets issued by the American Management Association.

Pamphlets offered are: Personnel Series No. 108, $1.00, *Checking the Effectiveness of Employee Communication;* No. 113, $1.00, *Influencing and Measuring Employee Attitudes;* No. 116, $1.00, *Strengthening Management's Channels of Communication;* Office Management Series No. 118, $.50, *Attitudes and Morale of Office Workers.*

Various Types of Drilling, Surface Practice Covered

Drilling and Surfacing Practice, by Fred H. Colvin, editor emeritus, *American Machinist,* and Frank a. Stanley, formerly editor, *Western Machinery and Steel World;* cloth, 523 pages, 6¼ x 9¼ inches; published by McGraw-Hill Book Co. Inc., New York, for $5.00.

How to drill, ream, tap, plane, shape, slot, mill and broach according to the most advanced methods is shown in this book, now in its third edition. The revision incorporates all of the major developments that have taken place in this field since 1936, including those techniques evolved during the war years that have become a standard part of postwar practice. All information is given in a simple, clear-cut, easy-to-follow manner.

Included are methods, suggestions and illustrations from the leading shops in the country. New data on drills of various sizes, new tables on step drilling, dealing with use of deep taper pins and new designs and uses for reamers and taps also are included. Improvements in the field of

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milling machines are discussed, covering the newer types of carbide and high speed steel cutters. Book is divided into six sections: Drilling, reaming and tapping, planers and shapers, milling, milling cutters and broaching.

Book Devoted to Die Castings Designs

Practical Considerations in Die Casting Design, published by New Jersey Zinc Co., New York, N. Y.; cloth, 246 pages, 6¼ x 9¼ inches; price, $3.00.

With the increased interest in problems pertaining to the design of die castings, it was decided to publish this book. As a study of products already in production aids in the design of any high production product and as such a study acquaints the designer with what has been done and has proved economical, this book is devoted primarily to the discussion of specific designs and applications of die castings, of all alloys now in use and to practical considerations that are involved in their design.

Profusely illustrated with photographs, the book is divided into 15 chapters, some of which are entitled: Section Thickness, Where Intricacy is an Asset, Cores Are Assets in Die Casting, When To Use and When To Avoid Undercuts, Fastening Expedients, How Design Influences Polishing Costs and Appearance Factors. Also included are a bibliography and an index.

Corrosion Committee Directory Published

Directory of the American Co-Ordinating Committee on Corrosion; paper, 6 x 9 inches, 62 pages; published by National Association of Corrosion Engineers, Houston, Tex., for $2.00.

Included in the directory are the names, addresses and fields of special endeavor of many of the principal corrosion workers in the United States and Canada. A cross-index system is arranged to make it possible to find the name and address of a specialist in some particular phase of corrosion.

Directory consists of four parts: A subject index; an alphabetical index of individuals including addresses; an alphabetical index of organizations and companies; and a numerical serial number listing of individuals. Section I is an alphabetical listing of corrosion subjects, under each of which are given the reference numbers of authors listed in section IV.

Metal Users More Cautious

Resistance to premium-priced offerings grows despite continued shortages

NONFERROUS metal consumers are more cautious in making fresh commitments, although supplies are still far from adequate to meet needs fully. This has tended to slow down activity in the markets more than has been usual in recent years during the holiday season. The most noticeable effect of this lighter inquiry on prices is a stiffening resistance to premium priced offerings.

Copper—No confirmation of transactions involving Mexican and Chilean copper at substantial premiums has been obtained, although large tonnages reportedly have been offered since mid-December. At the same time, sales in the export market have been reported up to 24.50c, f.a.s., New York.

Copper consumption in the United States declined 18,034 tons during November to 108,666 net tons, establishing the second lowest total for the year to date and comparing with 105,829 for November, 1947. Deliveries of refined copper to fabricators amounted to 100,055 tons during November, or 8611 tons less than was consumed during that month.

Stocks of copper in the hands of fabricators totaled 372,332 tons as of Nov. 30, representing a decline of 3866 tons from the preceding month. After deduction of 299,683 tons as working stocks, fabricators had a reserve supply on hand and in sight of only 149,092 tons, compared with the high for the year of 222,968 tons at the end of September and 175,218 tons at the end of October.

Unfilled orders on the books of fabricators as of Nov. 30 called for 298,838 tons of copper, or approximately double the reserve supply of copper on hand at the end of the month. Deficit in the consumers' sales position therefore rose to 149,746 tons from 120,810 tons as of Oct. 31 and was the largest since the end of September, 1947, when it stood at 153,647 tons.

Lead—First quarter 1949 export quotas of lead in pigs, bars, blocks and ingots, as established by the Office of International Trade, total 650 net tons. Of this total, 349 tons were assigned to various participating countries, 255 tons for projects and 46 tons for reserve. OIT also established quotas totaling 650 tons of lead sheet and pipe, including bends.

Producers' allotments to domestic customers for January generally are

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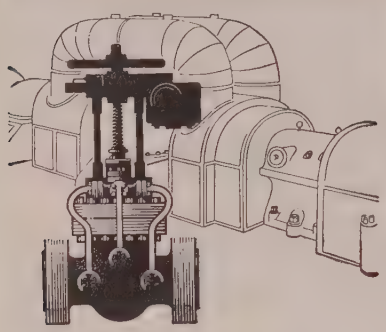

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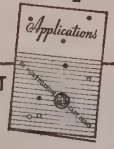

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somewhat smaller than in the month just ended so that the government's stockpile requirements can be met.

Zinc—Toward the close of the old year, demand for zinc tapered due to slower operations in the die casting and rolled zinc industries. Market interests are watching developments closely to determine whether this is a seasonal trend or whether it will continue during the early weeks of the new year. Sellers of slab zinc generally welcome the respite from the prolonged pressure under which they have been working to fill customers' needs and point out that demand still exceeds supply.

Tin—Due to developments which are considered unfavorable to our interests, Economic Co-operation Administration has halted all Marshall Plan aid to the Netherlands East Indies. Part of these funds would have been used for stimulating production of tin. However, the Billiton Co. has announced that rehabilitation of its mining properties has almost been completed. The company has completely recouped its war losses and some of its equipment is now better than before the war, according to a report to stockholders.

Copper Outlook Promising

New York — Government's stockpiling program has greatly intensified the continuing copper shortage, according to press reports quoting Louis S. Cates, chairman, Phelps Dodge Corp. He said outlook for the copper industry in 1949 is promising and that reduction in tonnage for the government's stockpile for six to twelve months would be most helpful to consumers and might serve to prevent any further price advance for the metal. He said the present price for copper is high enough and that a further rise would not increase production materially.

1949 Copper Needs To Be Big

New York—The need for fabricated copper products in 1949 will be large with many electrical utility modernization programs to be completed and the ever increasing demands for copper products in connection with the National Preparedness Program, according to Wylie Brown, president, Phelps Dodge Copper Products Corp., this city.

Aluminum Demand Still Strong

Pittsburgh—The continuing strong demand for aluminum and its products, plus a combination of conditions which prevent adequate in-

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eases in production, provoked a ht supply-and-demand situation in minum throughout 1948. It is probe that demand will continue to exed supply for the early part of 49 as well, says Roy A. Hunt, presint, Aluminum Co. of America.

Droughts throughout many areas North America, coupled with unecedented industrial and domestic quirements for electric power, have mpered the industry for many nths.

Military requirements for the Air rce programs and other defense plications will have an increasingly bstantial effect on the supply of uminum for civilian use, as security eds must be given priority.

Serious low water conditions in nadian hydroelectric reservoirs ean that considerably less aluminum r imports into the United States will available.

Another factor limiting aluminum pply in 1949 is that Alcoa's smelt- g works at Niagara Falls, N. Y., ll be permanently closed in Febru- y. This will reduce the company's nelting capacity by approximately million pounds a year.

To counter the effect of produc- on losses from the above causes, lcoa some months ago began erec- on of a smelting plant on the Gulf ast at Point Comfort, Tex., which ll use natural gas to generate the quired electricity for aluminum pro- uction. This works should be in op- ation early in 1950.

During 1948, Alcoa virtually nished its new sheet and plate roll- g mill at Davenport, Iowa. It will into extensive operation when suf- cient metal becomes available. Also mpleted during the year was the ew Alcoa die-casting plant at Chi- ago.

eynolds Aluminum Output Up

Louisville — Record shipments of ore than 428,500,000 pounds of luminum were made by Reynolds letals Co. during 1948, according R. S. Reynolds, chairman. This mpares with about 400 million ounds in 1947 and 325 million pounds 1946. Total production of virgin luminum in the United States in 939 was 327 million pounds.

"In order to do everything possible alleviate the metal shortage, Reyolds in 1948 paid excessive power osts ranging up to 10 cents per ound of aluminum produced and hus succeeded in shipping the greatst amount of metal in its history. nsufficient power is seen as the only mitation on peak capacity produc- ion for 1949," Mr. Reynolds said.

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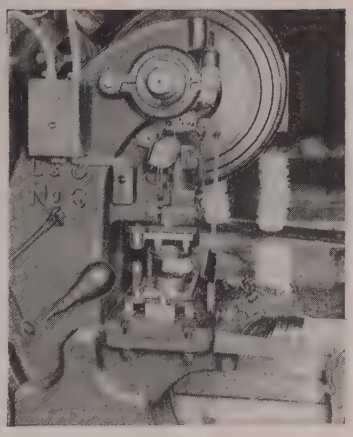

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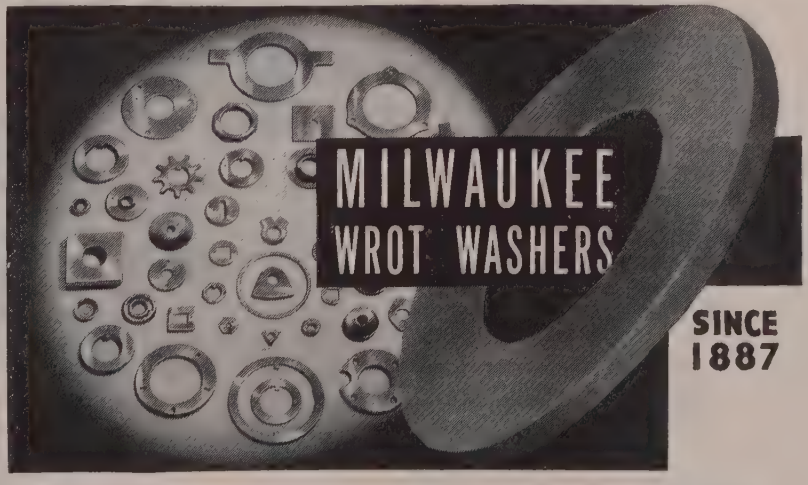

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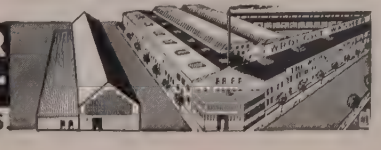

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Market Summary

OUTLOOK—Continued acute stringency in steel supply is indicated at least through the first half of the year despite a few soft spots in some areas of the metalworking industry over recent weeks. With order backlogs for some durable goods definitely down for the first time since the war, however, expectations are industrial buyers will display increasing inventory caution as demand-supply balance is struck in an increasing number of lines. As a result, progressive easing in pressure on steel suppliers is likely as the year advances, though there appears little chance supply will out-balance demand in any of the major products for months to come.

DEMAND—Steel consumption potential continues tremendous. All the larger consuming fields, such as automotive, railroad and petroleum, indicate they will continue to take every pound of metal they can lay their hands on. At the same time it appears likely that defense requirements may burgeon substantially over coming months. Increasing consumer resistance to the high prices quoted in the gray market is expected, however, and market authorities are alerted for any reflection of slackening demand in conversion ingot where definite turn to a buyers' market in steel is expected to show up first.

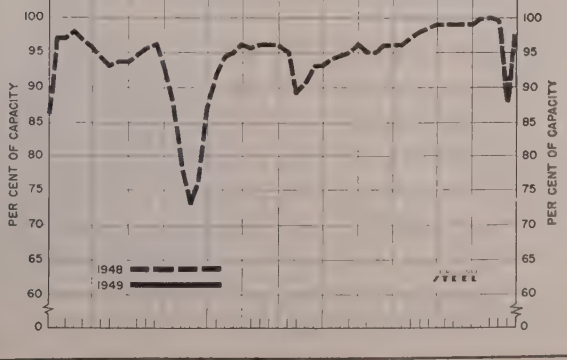
ALLOCATIONS—The new year opens with considerable uncertainty prevalent with respect to future government allocation policy. Generally, it is expected the 81st Congress will grant President Truman standby mandatory allocation powers, but use of such is not likely to be resorted to unless voluntary allocations prove inadequate. Whether Public Law 395, under which the voluntary programs have been administered, will be extended still is to be determined. However, the steelmakers already have agreed to continue the majority of the existing programs beyond the Feb. 28 expiration date of the law. Thus, a total of over 500,000 tons of steel products monthly is earmarked for delivery for freight car construction, atomic energy projects, the armed forces, tank and oil field work, barges, NACA, tankers and merchant vessels. In addition, several other programs are under consideration for extension.

PRODUCTION—Steelmaking operations are recovering to the high level that prevailed prior to the holidays and a new peak production rate may be established during the first quarter. In the closing weeks of 1948 the ingot rate hovered around the 100 per cent of capacity mark. Output for the year is estimated at 88,500,000 net tons of ingots, a new peacetime record. Finished steel production set a new alltime mark around 66 million tons. Barring prolonged production interruptions due to labor difficulties, the steelmakers expect to turn out in excess of 92 million tons of ingots in 1949.

RAW MATERIALS—Pressure for pig iron continues despite noticeable slackening in foundry activity. The foundries continue to take in domestic iron despite reduced melt. However, they are showing less interest in foreign iron which continues to command a substantial price premium. Steel scrap prices continue steady but demand is seasonally quiet. More buying activity is expected by the steel mills now with the holidays past. Price weakness, however, is evident in some sections of the market, especially on the foundry grades.

PRICES—As the new year gets under way steel product prices are holding steady. An advance of 50 cents per 100 lbs by an eastern producer of file steel was the only change noted the past week. STEEL's composites held unchanged throughout December, the year closing with finished steel at $95.50 against $78.05 a year ago; semifinished steel, $75.54 against $57.20; steelmaking pig iron, $46.29 compared with $36.56; and, steelmaking scrap, $43.25 compared with $39.92.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Jan. 1	Change	Same Week 1948	Same Week 1947
Pittsburgh	93.5	+13.5*	102	96
Chicago	99	+14	94	88.5
Eastern Pa.	83.5	None	92	78
Youngstown	105	+20	102	78
Wheeling	92.5	+ 3	90.5	86
Cleveland	96	+ 2	91	87
Buffalo	104	None*	87.5	90.5
Birmingham	100	+ 2	99	99
New England	86	None	83	89
Cincinnati	99	+ 9	89	82
St. Louis	77.5	— 2	89.5	68
Detroit	99	+10*	92	95
Estimated national rate	97.5	+ 9.5	97	88.5

*Revised.

Based on weekly steelmaking capacity of 1,802,476 net tons for 1948; 1,749,928 tons for 1947; 1,762,381 tons for 1946.

General Summary—P. 119

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Jan. 1	Dec. 25	Month Ago Dec. 1948	Year Ago Jan. 1948	5 Years Ago Jan. 1944
Finished Steel	$95.50	$95.50	$95.50	$78.26	$56.73
Semifinished Steel	75.75	75.75	75.75	60.46	36.00
Steelmaking Pig Iron	46.29	46.29	46.29	38.50	23.00
Steelmaking Scrap	43.25	43.25	43.25	40.75	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Dec. 1948	4.16150c
Nov. 1948	4.16150c
Oct. 1948	4.16150c
Dec. 1947	3.49055c
Dec. 1943	2.38649c

* **STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

† **FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. November and December, 1948 figures are preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

Finished Materials

	Jan. 1, 1949	Dec. 1948	Oct. 1948	Jan. 1948
Steel bars, Pittsburgh mills	3.45c	3.45c	3.45c	2.90c
Steel bars, del. Philadelphia	3.79	3.79	3.79	3.348
Steel bars, Chicago mills	3.35	3.35	3.35	2.90
Shapes, Pittsburgh mills	3.275	3.275	3.275	2.80
Shapes, Chicago mills	3.25	3.25	3.25	2.80
Shapes, del. Philadelphia	3.48	3.48	3.48	2.966
Plates, Pittsburgh mills	3.50	3.50	3.50	2.80
Plates, Chicago mills	3.40	3.40	3.40	2.95
Plates, del. Philadelphia	3.71	3.71	3.71	3.186
Sheets, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	2.80
Sheets, cold-rolled, Pittsburgh	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Pittsburgh	4.40	4.40	4.40	3.90
Sheets, hot-rolled, Gary mills	3.25	3.25	3.25	2.80
Sheets, cold-rolled, Gary mills	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Gary mills	4.40	4.40	4.40	3.90
Strip, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	2.80
Strip, cold-rolled, Pittsburgh mills	4.375	4.375	4.375	3.55
Bright basic, wire, Pittsburgh	4.325	4.325	4.325	3.675
Wire nails, Pittsburgh mills	5.775	5.775	5.775	4.625
Tin plate, per base box, Pitts. dist.	$6.70	$6.80	$6.80	$5.75

Semifinished

Sheet bars, mill	$67.00*	$67.00*	$67.00*	$53.57
Slabs, Chicago	52.00	52.00	52.00	40.18
Rerolling billets, Pittsburgh	59.00	59.00	59.00	40.18
Wire rod 7/32 to ¼-inch, Pitts. dist.	3.775c	3.775c	3.775c	3.05c

* Nominal.

Pig Iron

	Jan. 1 1949	Dec. 1948	Oct. 1948	Jan. 1948
Bessemer, del. Pittsburgh (N.&S. sides)	$48.08	$48.08	$48.08	$40.379
Basic, Valley	46.00	46.00	46.00	38.40
Basic, eastern del. Philadelphia	50.17	50.17	47.77	41.372
No. 2 fdry., del. Pgh. (N.&S. sides)	47.58	47.58	47.58	39.879
No. 2 fdry., del. Philadelphia	50.67	50.67	48.27	41.871
No. 2 foundry, Chicago	46.25	46.25	45.13	38.60
No. 2 foundry, Valley	46.50	46.50	43.50	36.50
Southern No. 2 Birmingham	43.38	43.38	43.38	34.88
Southern No. 2 del. Cincinnati	49.09	49.09	49.09	37.74
Malleable, Valley	46.50	46.50	46.50	38.90
Malleable, Chicago	46.50	46.50	45.38	39.10
Charcoal, low phos., fob Lyles, Tenn.	66.00	66.00	66.00	50.00
Ferromanganese, f.o.b. Etna, Pa.	163.00	163.00	163.00	151.00*

* F.o.b. cars Pittsburgh.

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$42.75	$42.75	$42.75	$40.30
Heavy melt. steel, No. 2, E. Pa.	41.50	41.50	41.50	41.30
Heavy melt. steel, No. 1, Chicago	41.75	41.75	41.75	39.05
Heavy melt. steel, No. 1, Valley	42.75	42.75	42.75	40.04
Heavy melt. steel, No. 1 Cleveland	42.25	42.25	42.25	39.75
Heavy melt. steel, No. 1, Buffalo	48.50	48.50	48.15	43.30
Rails for rerolling, Chicago	69.50	70.38	65.50	60.00
No. 1 cast, Chicago	70.50	70.50	70.50	63.50

Coke

Connellsville, beehive furnace	$14.50	$14.50	$14.50	$12.50
Connellsville, beehive foundry	17.00	17.00	17.00	14.60
Chicago, oven foundry, ovens	20.40	20.40	20.40	19.19

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $100-$105 per gross ton. Forging quality, $50 per net ton, mill.

Alloy Steel Ingots: $51 per net ton, mill.

Rerolling Billets, Blooms, Slabs: $52 per net ton, mill, except: $62, Conshohocken, Pa.; $66, Monessen, Pa.; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: $61 per net ton, mill, except: $68, Conshohocken, Pa., mill.

Alloy Billets, Slabs, Blooms: Rerolling quality, $63 per net ton, mill except: $70, Conshohocken, Pa.

Sheet Bars: $67 nom., per net ton, mill; sales in open market $110-$115 per gross ton.

Skelp: 3.25c per lb. mill.

Tube Rounds: $76 per net ton, mill; some sellers quoting up to $120 per gross ton.

Wire Rods: Basic and acid open-hearth, 7/32 & 5/16-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburg, Calif.; 4.10c, Portsmouth, O., Los Angeles; 4.15c Monessen, Pa. One producer quotes 3.90c, Chicago base. Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in. (Base 20 tons one size): 3.35c, mill, except: 3.55c, Ecorse, Mich., Pittsburg, Monessen, Aliquippa, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, S. San Francisco, Los Angeles, Niles, Calif., Portland, Oreg., Atlanta, Seattle; 4.20c, Kansas City, Mo.; 4.25c, Minnequa, Colo.; 5.30c, Fontana, Calif.

Rail Steel Bars: (Base 10 tons): 3.35c, Moline, Ill., 5.10c, Williamsport, Pa.; another interest quotes 5.35c, mill.

Hot-Rolled Alloy Bars: 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 5.50c, Fontana, Calif.

Hot-Rolled Alloy Bar Shapes: 4.00c, mill.

Cold-Finished Carbon Bars (Base 40,000 lb and over): 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.20c, Indianapolis; 4.25c, Monessen, Pa.; 4.30c, Ecorse, Mich.; 4.35c, St. Louis; 4.36c, Plymouth, Mich.; 4.40c, Newark, N. J., Hartford, Putnam, Conn., Mansfield, Readville, Mass.; 4.45c, Camden, N. J.; 5.30c, Los Angeles.

Cold-Finished Alloy Bars: 4.65c, mill, except: 4.75c, Monessen, Pa.; 4.85c, Indianapolis; 4.95c, Worcester, Mansfield, Mass., Hartford.

High-Strength, Low-Alloy Bars: 5.10c, mill, except: 5.40c, Ecorse, Mich.

Reinforcing Bars (New Billet): 3.35c, mill, except: 3.55c, Monessen, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, Atlanta, Seattle, S. San Francisco, Los Angeles; 4.25c, Minnequa, Colo. Fabricated: To consumers: 4.25c, mill, except: 5.00c, Seattle.

Reinforcing Bars (Rail Steel): 4.65c, Williamsport, Pa., mill; another interest quotes 5.35c, mill.

Wrought Iron Bars: Single Refined: 8.60c, (hand puddled), McKees Rocks, Pa.; 9.50c, Economy, Pa. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa., 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

Sheets

Hot-Rolled Sheets (18 gage and heavier): 3.25c, mill, except: 3.25-3.30c, Cleveland; 3.30c, Pittsburgh; 3.45c, Ecorse, Mich.; 3.95c, Pittsburg, Torrance, Calif.; 5.00c, Conshohocken, Pa.; 5.65c, Fontana, Calif.; 6.25c, Kansas City, Mo.

Hot-Rolled Sheets (19 gage and lighter, annealed): 4.15c, mill, except: 4.40c, Alabama City, Ala.; 4.65c, Niles, O.; 5.05c, Torrance, Calif., Kokomo, Ind.

Cold-Rolled Sheets: 4.00c, mill, except: 4.20c, Ecorse, Mich.; 4.70c, Granite City, Ill.; 4.95c, Pittsburg, Calif.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) 4.40c, mill, except: 5.00c, Niles, O.; 5.15c, Pittsburg, Torrance, Calif.; 5.30c, Kokomo, Ind.

Galvannealed Sheets: 4.95c, mill, except: 5.05c, Indiana Harbor, Ind.; 5.55c, Niles, O.; 5.70c, Kokomo, Ind.

Culvert Sheets, No. 16 flat Copper Steel (based on 5-cent zinc): 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.45c, Kokomo, Ind.; 5.75c, Pittsburg, Torrance, Calif.

Long Ternes, No. 10 (Commercial quality) 4.80c, mill.

Enameling Sheets, No. 12: 4.40c, mill, except: 4.60c, Granite City, Ill.; 4.70c, Ecorse, Mich.; 6.00c, Niles, O.

Silicon Sheets, No. 24: Field: 5.15c, mill. Armature: 5.45c, mill, except: 5.95c, Warren, O.; 6.05c, Niles, O.

Electrical: Hot-rolled, 5.95c, mill, except: 6.05c, Kokomo, Ind.; 6.15c, Granite City, Ill.; 6.45c, Warren, O.; 6.55c, Niles, O.

Motor: 6.70c mill except: 6.90c, Granite City, Ill.; 7.20c, Warren, O.; 7.95c, Follansbee, W. Va., Toronto, O.; 9.20c, Brackenridge, Pa.

Dynamo: 7.50c, mill, except: 8.65c, Follansbee, W. Va., Toronto, O.; 7.70c, Granite City Ill.; 10.00c, Brackenridge, Pa.

Transformer 72, 8.05c, mill, except: 9.15c, Follansbee, W. Va., Toronto, O.; 11.80c, Brackenridge, Pa.; 65, 8.60c, mill, except: 9.85c, Follansbee, W. Va., Toronto, O.; 12.35c Brackenridge, Pa.; 58, 9.30c, mill except: 10.55c, Follansbee, W. Va., Toronto, O.; 13.05c, Brackenridge, Pa.; 52, 10.10c, mill except: 11.35c, Follansbee, W. Va., Toronto, O.

High-Strength Low-Alloy Sheets: Hot-rolled, 4.95c, mill, except: 5.25c, Ecorse, Mich., and Conshohocken, Pa., mills.

Galvanized (No. 10), 6.75c, mill.

Cold-rolled, 6.05c, mill, except: 6.35c, Ecorse Mich.

Strip

Hot-Rolled Strip: 3.25c mill, except: 3.30c, Cleveland, Pittsburgh, Riverdale, Ill.; 3.25-3.35c,* Sharon, Pa.; 3.45c, Ecorse, Mich., Atlanta; 3.60c, Detroit; 3.70c, West Leechburg, Pa.; 4.00c, Pittsburg, Torrance, Calif.; 4.25c, Seattle, S. San Francisco, Los Angeles; 4.20c, Kansas City, Mo.; 4.30c, Minnequa, Colo.; 4.90c, Fontana, Calif. One company quotes 3.90c, Pittsburgh base.

*Wider than 6-in. and 6-in. and narrower respectively.

Cold-Rolled Strip (0.25 carbon and less): 4.00c, mill, except 4.00-4.25c, Warren, O.; 4.00-4.50c, Youngstown; 4.20c, Ecorse, Mich.; 4.25c, Riverdale, Ill.; 4.40-4.50c, Detroit; 4.50c, New Haven, Conn., West Leechburg, New Castle, Pa., Boston; 4.75c, Dover, O., New Kensington, Pa.; 4.50-5.00c, Trenton, N. J.; 4.80-5.00c, Wallingford, Conn.; 5.75c, Los Angeles; 7.10c, Fontana, Calif. One company quotes 4.55c, Cleveland or Pittsburgh base, and 4.75c, Worcester, Mass., base; another, 5.00c, Pittsburgh base.

Cold-Finished Spring Steel: 0.26-0.40 C, 4.00c, mill, except: 4.25c, Dover, O., Chicago; 4.30c, Worcester, Mass.; 4.50c, New Castle, Pa., Boston, Youngstown; 4.75c, Wallingford, Conn. Over 0.40 to 0.60 C, 5.50c, mill, except: 5.65c, Chicago; 5.75c, Dover, O.; 5.80c, Worcester, Mass., Wallingford, Conn., Trenton, N. J.; 5.95c, Boston; 6.00c, New Castle, Pa. Over 0.60 to 0.80 C, 6.10c, mill, except: 6.25c, Chicago; 6.35c, Dover, O.; 6.40c, Worcester, Mass., Wallingford, Bristol, Conn., Trenton, N. J.; 6.60c, New Castle, Pa. Over 0.80 to 1.05 C, 8.05c, mill, except: 7.85c, Dover, O.; 8.20c, Chicago; 8.35c, Worcester, Mass., Bristol, Conn., Trenton, N. J. Over 1.05 to 1.35 C, 10.35c, mill, except: 10.15c, Dover, O.; 10.30c, Wallingford, Conn.; 10.50c, Chicago; 10.65c, Worcester, Mass., Trenton, N. J.

Cold-Rolled Alloy Strip: 9.50c, mill except: 9.80c, Worcester, Mass.

High-Strength, Low-Alloy Strip: Hot-rolled, 3.95c, mill, except: 5.25c, Ecorse, Mich., mill. Cold-rolled, 6.05c, mill, except: 6.35c, Ecorse, Mich., mill.

Tin, Terne Plate

Tin Plate: American Coke, per base box of 100 lb, 1.25 lb coating $7.50-$7.70; 1.50 lb coating $7.75-$7.95. Pittsburg, Calif., mill $8.25 and $8.50, respectively, for 1.25 and 1.50 lb coatings.

Electrolytic Tin Plate: Per base box of 100 lb, 0.25 lb tin, $6.45-$6.65; 0.50 lb tin, $6.70-$6.90; 0.75 lb tin, $7.00-$7.20.

Can Making Black Plate: Per base box of 100 lb, 55 to 128 lb basis weight $5.75-$5.85. Pittsburg, Calif., mill, $6.50.

Hollowware Enameling Black Plate: 29-gage, 4.30c per pound, except: 5.40c, Sparrows Point, Md.; 5.50c, Granite City, Ill.

Manufacturing Ternes (Special Coated): Per base box of 100 lb, $6.65, except: $6.75 Fairfield, Ala., Sparrows Point, Md.

Roofing Ternes: Per package 112 sheets; 20 x 28 in., coating I.C. 8-lb, $15.50.

Plates

Carbon Steel Plates: 3.40c, mill, except: 3.40-3.60c, Cleveland; 3.45c, Sparrows Point, Md., Johnstown, Pa., Lackawanna, N. Y.; 3.60c, Pittsburgh; 3.65c, Ecorse, Mich.; 3.75c, Coatesville, Pa.; 3.95c, Claymont, Del., Conshohocken, Pa.; 4.30c, Seattle, Minnequa, Colo.; 4.56c, Houston, Tex.; 5.80c, Fontana, Calif.; 6.50c, Harrisburg, Pa.; 6.25c, Kansas City, Mo.

Floor Plates: 4.55c, mill.

Open-Hearth Alloy Plates: 4.40c, mill, except: 5.10c, Coatesville, Pa., mill.

High-Strength, Low-Alloy Plates: 5.20c mill, except: 5.10c, Coatesville, Pa.; 5.30c, Conshohocken, Pa., Sparrows Point, Md., Johnstown, Pa.; 5.65c, Ecorse, Mich., Sharon, Pa.

Shapes

Structural Shapes: 3.25c, mill, except: 3.30c, Bethlehem, Pa., Lackawanna, N. Y., Johnstown, Aliquippa, Pa.; 3.85c, Torrance, Calif.; 4.15c, Minnequa, Colo.; 4.30c, Seattle, S. San Francisco, Los Angeles; 5.75c, Fontana, Calif.

Alloy Structural Shapes: 4.05c, mill.

Steel Sheet Piling: 4.05c, mill.

High-Strength, Low-Alloy Shapes: 4.95c, mill. Except: 5.05c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.

Wire and Wire Products

Wire to Manufacturers (carloads): Bright, Basic or Bessemer Wire, 4.15c, mill, except: 4.25c, Sparrows Point, Md., Kokomo, Ind.; 4.45c, Worcester, Mass.; 4.50c, Monessen, Pa.; Minnequa, Colo., Atlanta, Buffalo; 4.70c, Portsmouth, O.; 4.80c, Palmer, Mass.; 5.10c, Pittsburg, Calif.; 5.15c, S. San Francisco; 5.40c, Shelton, Conn. One producer quotes 4.50c, Chicago base; another, 4.50c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Basic MB Spring Wire, 5.55c, mill, except: 5.30c, Portsmouth, O.; 5.65c, Sparrows Point, Md., Monessen, Pa.; 5.85c, Worcester, Palmer, Mass., Trenton, N. J.; 6.50c, Pittsburg, Calif.

Upholstery Spring Wire, 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

Wire Products to Trade (carloads): Merchant Quality Wire: Annealed (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md.; 4.95c, Monessen, Pa.; 5.10c, Worcester, Mass.; 5.15c, Minnequa, Colo., Kokomo, Ind.; 5.20c, Atlanta; 5.75c, S. San Francisco, Pittsburg, Calif. One producer quotes 5.15c, Chicago and Pittsburgh base; another, 5.20c. Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Galvanized (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md.; 5.40c, Monessen, Pa.; 5.55c, Worcester, Mass.; 5.60c, Kokomo, Ind., Minnequa, Colo.; 5.65c, Atlanta; 6.20c, Pittsburgh, S. San Francisco, Calif. One producer quotes 5.60c, Pittsburgh and Chicago base; another, 5.65c, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Nails and Staples: Standard, cement-coated and galvanized nails and polished and galvanized staples, Column 103, mill, except: 105, Sparrows Point, Md., Kokomo, Ind.; 109 Worcester, Mass.; 110 Minnequa, Colo., Atlanta; 117, Portsmouth, O.; 123, Pittsburg, Calif.; 124, Cleveland; 126, Monessen, Pa.; $6.75 per 100 pound keg, Conshohocken, Pa., Wheeling, W. Va. One producer quotes column 109, Chicago and Pittsburgh base; another, column 113, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Woven Fence (9 to 15½ Gage, inclusive): Column 109, mill, except: 113, Monessen, Pa., Kokomo, Ind.; 116, Minnequa, Colo.; 121 Atlanta; 132, Pittsburg, Calif. One producer quotes column 113, Pittsburgh and Chicago base; another column 114, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Barbed Wire: Column 123 mill, except: 125, Sparrows Point, Md., Kokomo, Ind.; 126, Atlanta; 128, Monessen, Pa.; 130, Minnequa, Colo.; 143, Pittsburg, Calif.; 145, S. San Francisco. One producer quotes 127, Chicago and Pittsburgh base.

Fence Posts (with clamps): Column 114, Duluth; 115, Johnstown, Pa.; 116, Moline, Ill.; 122, Minnequa, Colo.; $123.50 per net ton, Williamsport, Pa.

Bale Ties (single loop): Column 106, mill, except: 108, Sparrows Point, Md., Kokomo, Ind.; 110, Atlanta; 113 Minnequa, Colo.; 130, S. San Francisco, Pittsburg, Calif. One producer quotes column 115, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Stainless Steels

(Mill prices, cents per pound)

CHROMIUM NICKEL STEELS

Type No.	Bars, Wire Shapes	Strip, Cold-Rolled	Sheets
301.....	28.50-28.75	30.50-32.00	37.50-40.75
302.....	28.50-28.75	33.00-33.75	37.50-40.75
303.....	31.00-31.50	36.50-39.75	39.50-43.00
304.....	30.00-31.25	35.00-35.75	39.50-43.00
316.....	46.00-48.00	55.00-57.25	53.00-57.25
347.....	38.50-39.75	48.50-50.25	50.00-54.00

STRAIGHT CHROMIUM STEELS

410.....	22.75-23.00	26.50-27.00	32.00-33.00
416.....	23.25-23.50	28.25-33.50	32.50-33.50
430.....	23.25-23.50	27.00-27.50	34.75-35.50
446.....	32.50-33.00	60.00-62.25	46.50-50.00

STAINLESS-CLAD STEELS

	Plates —Cladding—		Sheets —Cladding—	
	10%	20%	10%	20%
302.....	....	....	19.75	21.50
304.....	22.50	26.50	20.75	22.50
310.....	32.50	36.50	....	....
316.....	27.00	31.00	26.00	28.00
321.....	23.50	27.50	....	....
347.....	25.00	29.00	24.00	26.00
405.....	18.75	24.75	....	....
410.....	18.25	24.25	....	....
430.....	18.25	24.25	....	....

Tool Steels

Tool Steel: Cents per pound, producing plants; reg. carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

W	Cr	V	Mo	Co	Base Per lb
18	4	1	...	...	90.50c
18	4	2	...	...	102.50c
18	4	3	...	...	114.50c
18	4	2	...	9	168.50c
1.5	4	1	8.5	...	65.00c
6.4	4.5	1.9	5	...	69.50c
6	4	3	6	...	88.00c

Tubular Goods

Standard Steel Pipe: Mill prices in carlots, threaded and coupled, to consumers about $200 a net ton.

In.	Butt Weld Blk.	Gal.	In.	Blk.	Gal.
⅛.....	39½–	8½–	1.....	46–	25–
	41½	12½		48½	27½
¼.....	37½–	9½–	1¼....	46½–	25½–
	39½	14		49	28
⅜.....	34–	4½–	1½....	47–	26–
	36	9		49½	28½
			2.....	47½–	26½–
½.....	40½–	18–		50	29
	43	21½	2½, 3..	48–	27–
¾.....	43½–	22–		50½	29½
	46	24½	3½ & 4.	44½	22½

In.	Lap Weld Blk.	Gal.	Elec. Weld Blk.	Gal.	Seamless Blk.	Gal.
2....	39½	17½	38½	16½	27–	5–
					38½	17
2½..	42½–	20½–	41½	19½	32½–	10½–
	43½	21½			41½	20
3....	42½–	20½–	41½	19½	35–	13–
	43½	21½			41½	20
3½&4	42½–	20½–	43½	21½	38½–	16½–
	46½	24½			43½	22
5 & 6	42½–	20½–	43½	21½	38½–	16½–
	44½	22½			43½	22
7....	....	....	....	....	43½	20½

Line Steel Pipe: Mill prices in carlots to consumers about $200 a net ton.

In.	Butt Weld Blk.	Gal.	In.	Butt Weld Blk.	Gal.
⅛.....	40½	....	1¼....	46–	26–
¼.....	38½	....		48	27
⅜.....	35	....	1½....	46½–	26½–
½.....	40–	18½–		48½	27½
	42	19½	2.....	47–	26½–
¾.....	43–	22½–		49	28
	45	23½	2½ & 3	47½–	27–
1.....	45½–	25½–		49½	28½
	47½	26½	3½ & 4	43½	....

In.	Lap Weld Blk.	Gal.	Elec. Weld Blk.	Gal.	Seamless Blk.	Gal.
2....	38½	16½	37½	15½	26–	4–
					37½	16
2½..	42½	20½	40½	19½	31½–	9½–
					40½	19
3....	42½	20½	40½	19½	34–	12–
					40½	19
3½-4.	41½–	20–	42½	20½	37½–	15½–
	45½	23½			42½	21
5 & 6.	41½–	20	42½	20½	37½–	15½–
	43½				42½	21
8....	45½	....	44½	21½–	40½–	17½–
				22	44½	22
10...	45	....	44	21–	41½–	18½–
				21½	44	21½
12...	44	....	43	20	40½–	17½–
					43	20½

Standard Wrought Iron Pipe: Mill price in carlots, threaded and coupled, to consumers about $200 a net ton.

In.	Butt Weld Blk.	Gal.	In.	Lap Weld Blk.	Gal.
⅜...	+59½	+95½	1¼..	+22	+53
½...	+20½	+52½	1½..	+15½	+45½
¾...	+10½	+41½	2....	+ 7½	+36½
1 and			2½-3½	+ 5	+32
1¼	+ 4½	+32½	4....	List	+26
1½..	— 1½	+29	4½-8	+ 2	+27½
2....	— 2	+28½	9-12.	+12	+37

Boiler Tubes: Net base c.l. prices, dollars per 100′, mill; minimum wall thickness, cut lengths 4 to 24″; inclusive.

(Following prices on seamless boiler tubes raised 10% by Babcock & Wilcox Tube Co. as of Nov. 22.)

O.D. In.	B.W. Ga.	Seamless Hot Rolled	Seamless Cold Drawn	Elec. Weld Hot Rolled	Elec. Weld Cold Drawn
1	13	....	13.39	13.00	13.00
1¼	13	....	15.87	13.21	15.39
1½	13	$15.05	17.71	14.60	17.18
1¾	13	17.11	20.15	16.60	19.54
2	13	19.18	22.56	18.60	21.89
2¼	12	23.54	27.70	22.83	26.88
2½	12	25.79	30.33	25.02	29.41
2¾	12	27.33	32.14	26.51	31.18
3	12	28.68	33.76	27.82	32.74
3¼	11	33.39	39.29	32.39	38.11
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

Pipe, Cast Iron: Class B, 6-in. and over, $93.50 per net ton, Birmingham; $106.70, del. Chicago; 4-in. pipe, $5 higher; Class A pipe, $5 a ton over Class B.

Rails, Supplies

Rails: Standard, over 60-lb; $3.20 per 100 lb, mill, except: $3.50, Indiana Harbor, Ind., and Minnequa, Colo.

Light (billet): $3.55 per 100 lb, mill, except: $4.25, Minnequa, Colo.

Light (rail steel): $5.10 per 100 lb,, Williamsport, Pa.

Railroad Supplies: Track bolts, treated: $8.50 per 100 lb, mill. Untreated: $8.25, mill.

Tie Plates: 4.05c mill, except: 4.20c, Pittsburg, Calif.; 4.50c, Seattle.

Splice Bars: 4.25c, mill.

Standard Spikes: 5.35c, mill, except: 5.25c, Pittsburgh.

Axles: 5.20c, mill.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

	Per gross Ton			
	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., furnace	$48.00	$48.50	$49.00	$49.50
Newark, N. J., del.	50.39	50.89	51.39	51.89
Brooklyn, N. Y., del.	....	52.40	52.90	....
Philadelphia, del.	50.17	50.67	51.17	51.67
Birmingham, furnace	42.88	43.38	....	....
Cincinnati, del.	....	49.09	....	....
Buffalo, furnace	*47.00	*47.00	*47.50	48.00
Boston, del.	55.42	55.42	55.92	....
Rochester, del.	49.22	49.22	49.72	50.22
Syracuse, del.	50.025	50.025	50.525	41.025
§**Chicago,** district furnaces	46.00	46.00-46.50	46.50	47.00
Milwaukee, del.	47.72	47.72-48.22	48.22	48.72
Muskegon, Mich., del.	....	50.98-51.48	51.48	....
Cleveland, furnace	46.00	46.50	46.50	47.00
Akron, del.	48.17	48.67	48.67	49.17
Lone Star, Tex., furnace	....	†75.00	....	....
Duluth, furnace	....	46.50	46.50	47.00
Erie, Pa., furnace	46.00	46.50	46.50	47.00
Everett, Mass., furnace	....	52.75	53.25	....
Geneva, Utah, furnace	46.00	46.50	....	....
Seattle, Tacoma, Wash., del.	....	53.63	....	....
Portland, Oreg., del.	....	53.63	....	....
Los Angeles, San Francisco	53.13	53.63	....	....
Granite City, Ill., furnace	47.90	48.40	48.90	....
St. Louis, del.	48.65	49.15	49.65	....
Ironton, Utah, furnace	....	46.50	....	....
‡**Neville Island, Pa.,** furnace	46.00	46.50	46.50	47.00
Pittsburgh, del., N.&S. Sides	47.08	47.58	47.58	48.08
Pittsburgh (Carnegie), furnaces	46.00	....	....	47.00
Sharpsville, Pa., furnace	46.00	46.50	46.50	47.00
Steelton, Pa., furnace	48.00	48.50	49.00	49.50
Struthers, O., furnace	42.50	....	....	....
Swedeland, Pa., furnace	50.00	50.50	51.00	....
Toledo, O., furnace	46.00	46.50	46.50	47.00
Cincinnati, del.	50.55	51.05	....	....
Youngstown, O., furnace	46.00	46.50	46.50	47.00
Mansfield, O., del.	49.87	50.37	50.37	50.87

* Republic Steel Corp. quotes $1 a ton higher for basic, No. 2 foundry and malleable at Buffalo.

† Low phosphorus southern grade.

‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaca; $1.73 Verona; $1.94 Brackenridge; $1.08 for Ambridge and Aliquippa.

§ Includes, in addition to Chicago, South Chicago, Ill., East Chicago, Gary and Indiana Harbor, Ind.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base) $59.50
6.51-7.00 .. 60.75 9.01- 9.50. 67.00
7.01-7.50 .. 62.00 9.51-10.00. 68.25
7.51-8.00 .. 63.25 10.01-10.50. 69.50
8.01-8.50 .. 64.50 10.51-11.00. 70.75
8.51-9.00 .. 65.75 11.01-11.50. 72.00

F.o.b. Jackson, O., per gross ton. Buffalo furnace $1.25 higher.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $84.75 furnace, Niagara Falls; $84 open-hearth and $85 foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.45% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus, f.o.b. furnace, Lyles, Tenn. ..$66 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Low Phosphorus

Steelton, Pa., $54; Buffalo, Troy, N. Y., $50; Philadelphia, $56.81 delivered.

Intermediate phosphorus, Central furnace, Cleveland, $51.

Differentials

Prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Fluorspar

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.

Metallurgical Coke

Price per Net Ton Beehive Ovens	
Connellsville, furnace	$13.50-15.50
Connellsville, foundry	16.00-18.00
New River, foundry	16.50
Wise county, foundry	15.35
Wise county, furnace	14.60
Oven Foundry Coke	
Kearney, N. J., ovens	$21.50
Chicago, ovens	20.40
Chicago, del.	†21.75
Detroit, del.	23.95
Terre Haute, ovens	21.00
Milwaukee, ovens	21.15
Indianapolis, ovens	20.85
Chicago, del.	24.00
Cincinnati, del.	21.40
Detroit, del.	24.40
Ironton, O., ovens	18.25
Painesville, O., ovens	20.90
Erie, del.	22.57
Cleveland, del.	22.46
Buffalo, del.	23.25
Birmingham, ovens	17.70
Philadelphia, ovens	20.55
Swedeland, Pa., ovens	20.50
Portsmouth, O., ovens	19.25
Detroit, ovens	20.65
Detroit, del.	*21.65
Flint, del.	22.85
Pontiac, del.	21.91
Saginaw, del.	23.15

Includes representative switching charge of: *, $1; †, $1.35.

Coal Chemicals

Spot, cents per gallon, ovens

(Price effective as of Aug. 5)

Pure benzol	20.00
Toluol, one degree	20.50-26.50
Toluol, two degrees	23.00-26.50
Industrial xylol	20.50-26.50

Per ton bulk, ovens

Sulphate of ammonia	$45.00

Per pound, ovens

(Effective as of Oct. 1)

Phenol, 40 (cariots, returnable drums)	13.50
Do., less than cariots	14.25
Do., tank cars	12.50

(Effective as of Oct. 25)

Naphthalene flakes, balls, bbl to jobbers, "household use"	13.75

Refractories

(Prices per 1000 brick, f.o.b. plant)

Fire Clay Brick

Super Duty: St. Louis, Vandalia, or Farber, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $100.

High-Heat Duty: Salina, Pa., $85; Woodbridge, N. J., St. Louis, Farber, or Vandalia, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky.; Athens, or Troup, Tex., Stevens Pottery, Ga., or Portsmouth, O., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Pa., Bessemer, Ala., $66.

Ladle Brick

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa.; Chester, New Cumberland, W. Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., $83; Beach Creek, Pa., $73.

Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa. $85; Joliet or Rockdale, Ill., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., $81.

Basic Brick

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Chrome brick or chemical-bonded chrome brick, $69, magnesite brick, $91; chemical-bonded magnesite, $80.

Magnesite

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, $31; single paper bags, $35.50.

Dolomite

(Base prices per net ton)

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibonsburg, Woodville, O., $11.85, Thornton, McCook, Ill., $11.95; Dolly Siding, Bonne Terre, Mo., $12.05.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural) Lower Lake Ports

(Any increase or decrease in R. R. freight rates, dock handling charges and taxes thereon effective after Apr. 1, 1948, are for buyer's account.)

Old range bessemer	$6.60
Old range nonbessemer	6.45
Mesabi bessemer	6.35
Mesabi nonbessemer	6.20
High phosphorus	6.20

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% contract	15.25

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%	15.00
Brazil iron ore, 68-69%	19.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26–$28

Manganese Ore

48-50%, duty paid, f.o.b. cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 67.60c-72.60c.

Chrome Ore

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$25.50-$26.00
45% no ratio	26.50
48% no ratio	29.00-30.00
50% no ratio	29.50-30.50

Brazilian—nominal

44% to 2.5:1 lump	$33.65

Rhodesian

45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00

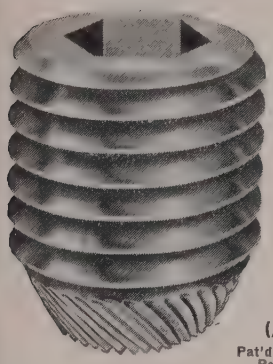
Domestic (seller's nearest rail)

48% 3:1	$39.00

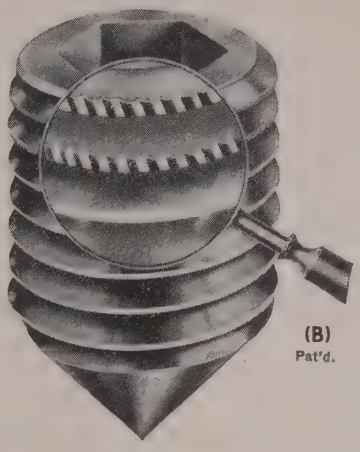
Molybdenum

Sulphide conc., lb, Mo., cont., Mines	$0.75

HONEST-TO-GOODNESS FASTENERS . . .



(A)
Pat'd. & Pats. Pending



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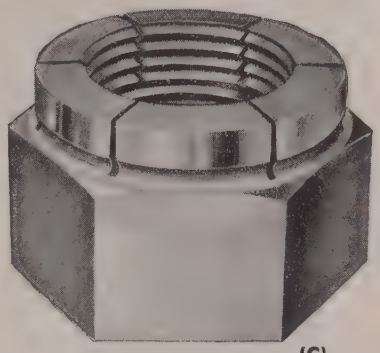
Pat'd.



(C)
Pat'd. & Pats. Pending

UNBRAKO
Reg. U. S. Pat. Off.

SELF-LOCKING SOCKET SET SCREWS
AND
FLEXLOC
SELF-LOCKING ONE-PIECE NUTS

(A) The KNURLED cup point of this popular "Unbrako" Socket Set Screw makes it a *Self-Locker* . . . because the keen edges of the counter-clock-wise KNURLS prevent creep, regardless of the most chattering vibration. An honest-to-goodness fastener, if ever there was one . . . it positively *won't shake loose!*

(B) The KNURLING of this "Unbrako" Socket Set Screw—as shown—"swages" the threads, so that it becomes a most excellent Self-Locker . . . positively *won't shake loose!* For use where the Knurled Cup Point cannot be utilized because of a hardened steel shaft . . . or where the other 5 standard points do not lend themselves to knurling. Sizes available from #4 to 1½" diameter, in a full range of lengths.

(C) The one-piece, all-metal, full-thread, resilient "Flexloc" Lock Nut is becoming widely accepted, because it is processed to have an exceptionally uniform torque . . . and because it is a "stop", a "lock" and a "plain" nut *all in one.* Sizes from #6 to 2" diameter, in *regular* and *thin* types—in NC and NF thread series.

Write us for the name and address of your nearest "Unbrako" Industrial Distributor and for your copy of the "Unbrako" Catalog.

Knurling of Socket Screws originated with "Unbrako" in 1934.

Pat'd. & Pats. Pending

"UNBRAKO" SOCKET HEAD STRIPPER BOLT WITH KNURLED HEAD

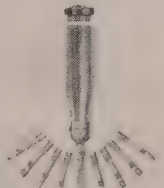
The Knurled head of this "Unbrako" Socket Head Stripper Bolt allows for fumble-proof grip—even if fingers and head are oily—thus, materially speeding production.

"HALLOWELL" STEEL COLLARS

"Hallowell" Solid Steel Collars are functionally proportioned throughout, highly polished all over, and run true as a die. 3" bore and smaller are made from Solid Bar Stock and fitted with the famous "Unbrako" *Knurled* Cup Point Self-Locking Socket Set Screw. Available in sizes from 3/16" to 3". Immediate delivery.

"HALLOWELL" KEY KIT

You can't loosen socket screws without a hex socket wrench, so why not get our #25 or #50 "Hallowell" Hollow Handle Key Kit which contains most all hex socket bits.



Kits, Pats. Pend.

OVER 46 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNSYLVANIA, BOX 579

BRANCHES: CHICAGO DETROIT ST. LOUIS SAN FRANCISCO

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$42.50-43.00*
No. 1 Heavy Melt Steel	42.50-43.00*
No. 1 Busheling	42.50-43.00
Nos. 1 & 2 Bundles	42.50-43.00
No. 2 Bundles	40.50-41.00
Machine Shop Turnings	37.50-38.00
Mixed Borings, Turnings	37.50-38.00
Short Shovel Turnings	38.00-39.00
Cast Iron Borings	38.00-39.00
Bar Crops and Plate	49.00-50.00
Low Phos. Steel	49.50-50.00
Heavy Turnings	39.50-40.00

Cast Iron Grades

No. 1 Cupola	65.00-66.00†
Machinery Cast	71.00-72.00
Charging Box Cast	61.00-62.00†
Heavy Breakable Cast.	60.00-61.00
Malleable	74.00-75.00
Brake Shoe	57.50-58.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.50-44.00
R.R. Malleable	75.00-80.00
Axles	55.25-56.25
Rails, Rerolling	59.00-60.00
Rails, Random Lengths	56.00-57.00
Rails, 3 ft and under.	60.00-61.00
Rails, 18 in. and under	61.50-62.00
Railroad Specialties	56.00-57.50†
Uncut Tires	54.50-55.00
Angles, Splice Bars	53.00-54.00

*Plus applicable freight springboard. †Nominal; no recent sales.

CLEVELAND

No. 1 Heavy Melt. Steel	$42.00-42.50*
No. 2 Heavy Melt. Steel	42.00-42.50*
No. 1 Busheling	42.00-42.50*
Nos. 1 & 2 Bundles	42.00-42.50*
Machine Shop Turnings	37.00-37.50
Mixed Borings, Turnings	36.50-37.50
Short Shovel Turnings.	38.00-38.50
Cast Iron Borings	38.00-38.50
Bar Crops and Plate	47.00-47.50
Punchings & Plate Scrap	47.00-47.50
Heavy Turnings	42.00-43.00
Alloy Free Turnings	40.00-41.00
Cut Structurals	48.50-51.50

Cast Iron Grades

No. 1 Cupola	71.00-72.00
Charging Box Cast	58.00-60.00
Stove Plate	65.00-67.00
Heavy Breakable Cast.	55.00-57.00
Unstripped Motor Blocks	55.00-57.00
Malleable	75.00-78.00
Brake Shoes	53.00-55.00
Clean Auto Cast	70.00-73.00
No. 1 Wheels	64.00-66.00
Burnt Cast	59.00-61.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00-44.00*
R.R. Malleable	79.00-81.00
Rails, Rerolling	62.00-65.00
Rails, Random Lengths	60.00-61.00
Rails, 3 ft and under.	63.00-66.00
Cast Steel	55.00-57.00
Railroad Specialties	58.00-60.00
Uncut Tires	58.00-59.00
Angles, Splice Bars	61.00-63.00

* Plus applicable freight springboard on earmarked material.

VALLEY

No. 1 Heavy Melt. Steel	$42.50-43.00*
No. 2 Heavy Melt. Steel	42.50-43.00
No. 1 Bundles	42.50-43.00
Machine Shop Turnings	37.00-39.00
Short Shovel Turnings.	39.00-39.50
Cast Iron Borings	38.50-39.00
Low Phos.	48.50-50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00-44.00*

* Plus applicable freight springboard.

MANSFIELD

Machine Shop Turnings	$37.50-38.00
Short Shovel Turnings.	39.50-40.00

CINCINNATI

No. 1 Heavy Melt. Steel	$42.00
No. 2 Heavy Melt. Steel	42.00
No. 1 Busheling	42.00
Nos. 1 & 2 Bundles	42.00
Machine Shop Turnings	36.00
Mixed Borings, Turnings	36.00
Short Shovel Turnings.	38.00
Cast Iron Borings	37.00

Cast Iron Grades

No. 1 Cupola Cast	63.00
Charging Box Cast	53.00
Heavy Breakable Cast.	59.00
Stove Plate	55.00
Unstripped Motor Blocks	56.00
Brake Shoes	50.00
Clean Auto Cast	63.00
Drop Broken Cast	71.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00
R.R. Malleable	75.00
Rails, Rerolling	62.00
Rails, Random Lengths	58.00
Rails, 18 in. and under	63.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$37.50-38.00
No. 1 Busheling	37.50-38.00
Nos. 1 & 2 Bundles	37.50-38.00
No. 3 Bundles	37.50-38.00
Machine Shop Turnings	31.50-32.00
Mixed Borings, Turnings	31.50-32.00
Short Shovel Turnings.	32.50-33.00
Cast Iron Borings	32.50-33.00
Punchings & Plate Scrap	42.50-43.00

Cast Iron Grades

No. 1 Cupola Cast	60.00-65.00
Heavy Breakable Cast.	54.00-59.00
Clean Auto Cast	60.00-65.00

BUFFALO

No. 1 Heavy Melt. Steel	$48.00-49.00
No. 2 Heavy Melt. Steel	41.75-42.25
No. 1 Busheling	41.75-42.25
Nos. 1 & 2 Bundles	41.75-42.25
Machine Shop Turnings	39.50-40.00
Mixed Borings, Turnings	39.50-40.00
Cast Iron Borings	39.50-40.00
Short Shovel Turnings.	40.50-41.00
Low Phos	49.00-51.00

Cast Iron Grades

No. 1 Cupola	67.00-68.00
Mixed Cupola	63.00-65.00
Heavy Breakable Cast.	55.00-57.00
Malleable	70.00-75.00
Clean Auto Cast	70.00-72.00

Railroad Scrap

Rails, 3 ft. and under.	59.00-61.00
Railroad Specialties	58.00-60.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$45.00-45.50
No. 2 Heavy Melt. Steel	41.50
No. 1 Busheling	41.50
Nos. 1 & 2 Bundles	41.50
No. 3 Bundles	39.50
Machine Shop Turnings	37.50
Mixed Borings, Turnings	37.50
Short Shovel Turnings.	41.00-41.50
Bar Crop and Plate	49.00-51.00
Punchings & Plate Scrap	49.00-51.00
Cut Structurals	49.00-51.00
Elec. Furnace Bundles.	47.00-48.00
Heavy Turnings	45.50-46.50
No. 1 Chemical Borings.	41.00-41.50

Cast Iron Grades

No. 1 Cupola Cast	62.00-63.00
No. 1 Machinery Cast.	65.00-66.00
Charging Box Cast	62.00-62.50
Heavy Breakable Cast.	62.00-62.50
Unstripped Motor Blocks	59.50
Malleable	80.00-82.00
Clean Auto Cast	62.00-63.00
No. 1 Wheels	71.00-72.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$39.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
Nos. 1 & 2 Bundles	37.00
No. 3 Bundles	35.00
Machine Shop Turnings	29.00-29.50
Mixed Borings, Turnings	29.00-29.50
Short Shovel Turnings.	30.00-31.50
Punching & Plate Scrap	41.00-42.00
Cut Structurals	41.00-42.00
Elec. Furnace Bundles.	41.00-42.00

Cast Iron Grades

No. 1 Cupola Cast	56.00
Charging Box Cast	56.00
Heavy Breakable	57.00-58.00
Unstripped Motor Blocks	53.50-54.50
Malleable	68.00-69.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$38.90
No. 2 Heavy Melt. Steel	34.40
No. 1 Bundles	34.40
No. 1 Busheling	34.40
Machine Shop Turnings	29.90
Mixed Borings, Turnings	29.90
Short Shovel Turnings.	31.90
Bar Crops and Plate	40.00-41.00
Punching & Plate Scrap	40.00-41.00
Chemical Borings	37.00-38.00

Cast Iron Grades

No. 1 Cupola Cast	60.00-65.00
Heavy Breakable Cast.	52.00-53.00
Stove Plate	54.00-55.00
Unstripped Motor Blocks	50.00-52.00
Clean Auto Cast	54.00-56.00

CHICAGO

No. 1 Heavy Melt. Steel	$41.50-42.00
No. 2 Heavy Melt. Steel	41.50-42.00
No. 1 Bundles	41.50-42.00
No. 2 Bundles	41.50-42.00
No. 3 Bundles	39.50-40.00
Machine Shop Turnings	36.50-37.00
Mixed Borings, Turnings	36.50-37.00
Short Shovel Turnings.	38.50-39.00
Cast Iron Borings	37.50-38.00
Bar Crops and Plate	46.00-47.00
Punchings	47.00-48.00
Elec. Furnace Bundles.	44.50-45.00
Heavy Turnings	41.00-41.50
Cut Structurals	46.50-47.00

Cast Iron Grades

No. 1 Cupola Cast	70.00-71.00
Clean Auto Cast	70.00-71.00
No. 1 Wheels	60.00-62.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	44.00-45.00
Malleable	81.00-82.00
Rails, Rerolling	69.00-70.00
Rails, Random Lengths	59.00-60.00
Rails, 3 ft. and under.	60.00-61.00
Rails, 18 in. and under	62.00-63.00
Railroad Specialties	51.00-52.00
Angles, Splice Bars	56.50-58.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$44.00-45.00
No. 2 Heavy Melt. Steel	40.00-41.00
Machine Shop Turnings	35.00-36.00
Short Shovel Turnings.	36.50-37.50

Cast Iron Grades (F.o.b. shipping point)

No. 1 Cupola Cast	63.00-65.00
Mixed Cast	56.00-58.00
Heavy Breakable Cast.	59.00-60.00
Brake Shoes	58.00-59.00
Clean Auto Cast	65.00-67.00
Burnt Cast	59.00-60.00

Railroad Scrap

R.R. Malleable	71.00-72.00
Rails, Rerolling	63.00-65.00
Rails, Random Lengths	56.00-59.00
Rails, 3 ft. and under.	60.00-61.00
Uncut Tires	51.00-52.00
Angles, Splice Bars	54.00-56.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$39.50
No. 2 Heavy Melt. Steel	39.50
No. 1 Busheling	39.50
Nos. 1 & 2 Bundles	39.00
No. 3 Bundles	37.00
Long Turnings	24.50
Short Shovel Turnings.	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	40.00
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	63.00
Stove Plate	60.00-62.00
No. 1 Wheels	59.00-61.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	nom.
Axles, Steel	50.00
Rails, Rerolling	53.00-55.00
Rails, Random Lengths	45.00-48.00
Rails, 3 ft. and under.	53.00-55.00
Angles and Splice Bars	52.00-53.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$27.50
No. 2 Heavy Melt. Steel	*27.50
No. 1 Busheling	*27.50
Nos. 1 & 2 Bundles	*27.50
No. 3 Bundles	*24.50
Machine Shop Turnings	*18.00
Bar Crops and Plate	*27.50
Cast Steel	*27.50
Alloy Free Turnings	*18.00
Cut Structurals	*27.50

Cast Iron Grades

No. 1 Cupola Cast	50.00-65.00

Railroad Scrap

No. 1 Heavy Melting	*28.50
Axles	*34.00
Rails, Random Lengths	*29.00

*F.o.b. California shipping point

SEATTLE

No. 1 Heavy Melt. Steel	$29.00-30.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Busheling	29.00-30.00
Nos. 1 & 2 Bundles	29.00-30.00
No. 3 Bundles	24.50
Machine Shop Turnings	21.00-22.50
Mixed Borings, Turnings	21.00-22.50
Punching & Plate Scrap	35.00
Cut Structurals	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	50.00
Heavy Breakable Cast	35.00
Stove Plate	30.00
Unstripped Motor Blocks	32.50
Malleable	40.00
Brake Shoes	35.00
Clean Auto Cast	40.00
No. 1 Wheels	37.50-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.50
Railroad Malleable	30.00
Rails, Random Lengths	30.00-32.00
Angles and Splice Bars	28.50

LOS ANGELES

No. 1 Heavy Melt. Steel	$27.50
No. 2 Heavy Melt. Steel	27.50
Nos. 1 & 2 Bundles	27.50
Machine Shop Turnings	20.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	33.00-36.00

Cast Iron Grades

No. 1 Cupola Cast	45.00-50.00

HAMILTON, ONT.

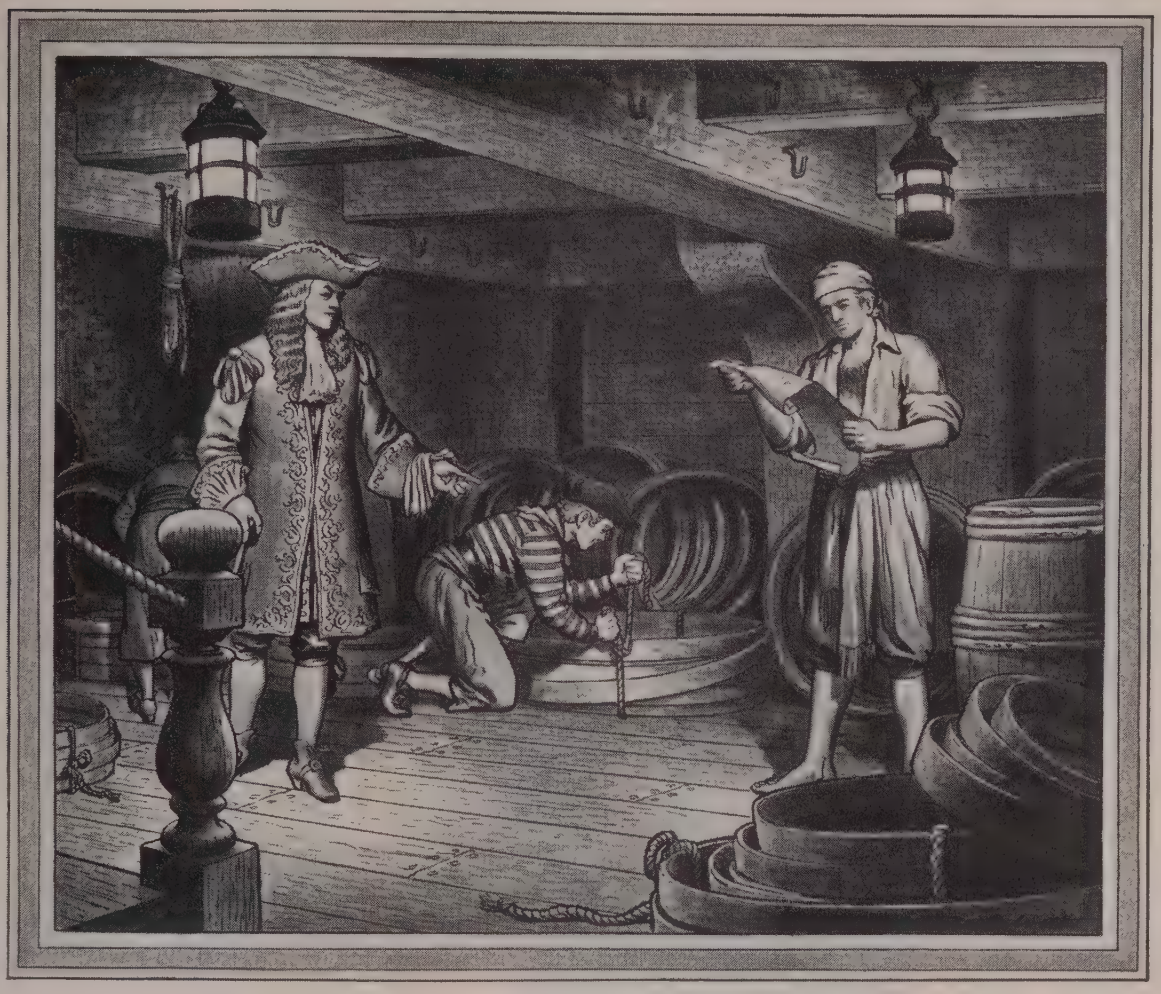
(Ceiling prices, delivered)

Heavy Melt.	$23.00
No. 1 Bundles	23.00
Mechanical Bundles	21.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	23.00
Rails, Rerolling	26.00
Bushelings	17.50
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	48.00-50.00
No. 2 Cast	44.00-45.00

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.



"PIECES OF EIGHT" and EIGHT TONS OF SCRAP

When the famous Captain Kidd was captured in 1699 the manifest of his ship showed a cargo of eight tons of "waggon tyres" to be melted in iron works in the Colonies for the manufacture of farm implements. Throughout the bold and adventurous history of America the use of scrap has played a significant role in the growth of industry. Today, scrap is still urgently needed.

CONSULT OUR NEAREST OFFICE FOR THE PURCHASE AND SALE OF SCRAP

LURIA BROTHERS AND COMPANY, INC.

Main Office

LINCOLN-LIBERTY BLDG.
Philadelphia 7, Pennsylvania

Yards

LEBANON, PA. • READING, PA.
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BUFFALO, N. Y. Genesee Bldg.
DETROIT, MICH. 2011 Book Bldg.
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READING, PA. Luria Bldg.
ST. LOUIS, MO. 2110 Railway Exchange Bldg.
SAN FRANCISCO, CAL. Pacific Gas & Elec. Co., Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 23.50c, Conn. Valley; Lake, 23.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 21.50-22.00c; 88-10-2 (No. 215) 31.00c; 80-10-10 (No. 305) 27.25c; No. 1 yellow (No. 405) 17.50c.

Zinc: Prime western 17.50c, brass special 17.75c, intermediate 18.00c, East St. Louis; high grade 18.50c, delivered.

Lead: Common 21.30-21.35c, chemical and corroding 21.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, fob shipping point, freight allowed.

Secondary Aluminum: Piston alloy (No. 122 type) 26.50-27.00c; No. 12 foundry alloy (No. 2 grade 25.75-26.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 28.00-30.00c; grade 2, 26.75-27.50c; grade 3, 25.75-26.25c; grade 4, 25.25-25.50c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb. and over, 20.50c, fob Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1,024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 38.50c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 39.00c, fob Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; shot nom.; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $90-$97 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.10.

Cobalt: 97-98%, $1.65 per lb for 550 lb (keg); $1.67 per lb for 100 lb (case); $1.72 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 70.00c per ounce.

Platinum: $89-$93 per ounce.

Palladium: $24 per troy ounce.

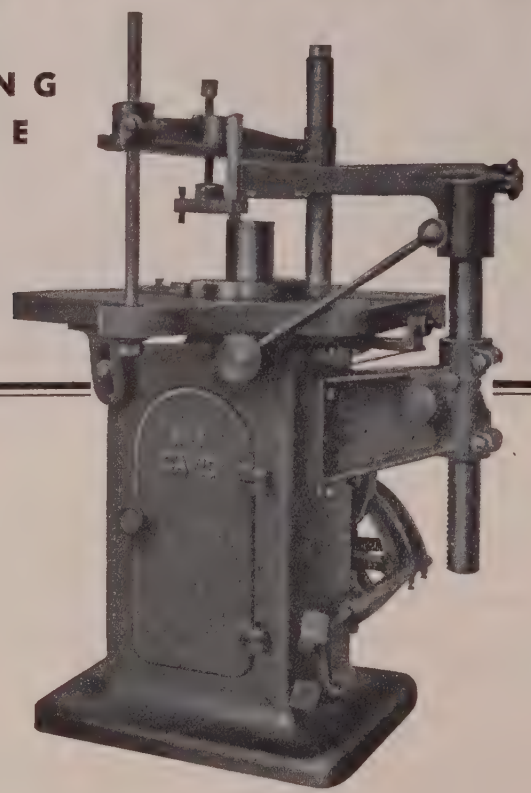
Iridium: $110-$115 per troy ounce.

Titanium (sponge form): $5 per pound.

New Type

"DAVIS" KEYSEATERS

with
TILTING TABLE



• Taper keyways may be cut by inclining table in either direction from horizontal. Scale indicates exact taper per foot. Cutter operates in vertical position, with resistance arm adjusted to different cutters. Table-type feed with adjustable feed stop.

DAVIS KEYSEATER CO.
397 EXCHANGE ST. ROCHESTER 8, N. Y.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 37.18; yellow brass 34.59; commercial bronze, 95%, 37.23; 90%, 36.88; red brass, 85%, 36.01; 80%, 35.66; best quality, 35.33; nickel silver, 18%, 46.92; phosphor-bronze, grade A, 5%, 56.05.

Rods: Copper, hot rolled 33.28; cold drawn 34.28; yellow brass, free cutting, 38.16; commercial bronze, 95% 36.92; 90% 36.57; red brass, 85% 35.70; 80% 35.35.

Seamless Tubing: Copper 37.22; yellow brass 37.60; commercial bronze 90% 39.54; red brass 85% 38.92; 80% 38.57.

Wire: Yellow brass 34.88; commercial bronze, 95% 37.52; 90% 37.17; red brass, 85% 36.30; 80% 35.95; best quality brass 35.62.

Copper Wire: Bare, soft, fob eastern mills, c.l. 29.42½c, l.c.l. 29.92½-30.05c; weatherproof, fob eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l. (Two producers quote 1-cent per pound lower.)

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	—Hexagonal— R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

rices to jobbers, fob Cleveland, Pittsburgh) eets: Full rolls, 140 sq ft or more, $27.25 cwt.; add 50c per cwt., 10 sq ft to 140 ft. Pipe: Full coils, $27.25 per cwt; cut ls, $27.50. Traps and Bends: List price as 80%.

ZINC

eets, 22.00-22.50c, fob mill, 36,000 lb and er. Ribbon zinc in coils, 20.75-21.50c, fob 1l, 36,000 lb and over. Plates, not over 12-, 19.75-20.50c; over 12-in., 20.75-21.50c.

NICKEL

(Base prices, fob mill)

eets, cold-rolled, 60.00c. Strip, cold-rolled .00c. Rods and shapes, 56.00c. Plates .00c. Seamless tubes, 89.00c.

MONEL

(Base prices, fob mill.)

eets, cold-rolled 47.00c; Strip, cold-rolled, .00c. Rods and shapes, 45.00c. Plates, 46.00c. amless tubes, 80.00c. Shot and blocks, .00c.

MAGNESIUM

truded Rounds, 12 in. long, 1.312 in. in ameter, less than 25 lb, 52.00-56.00c; 25 99 lb, 42.00-46.00c; 100 lb to 4000 lb., .00-36.00c.

lating Materials

hromic Acid: 99.9%, flake, fob Philadelphia, rloads, 26.00c; 5 tons and over 26.50c; 1 to tons, 27.00c; less than 1 ton, 27.50c.

opper Anodes: Base, 2000 to 5000 lb; fob ipping point, freight allowed: Flat unimmed 33.84c; oval 33.34c; electrodeposited, .09c; cast, 30.12c.

opper Cyanide: 70-71% Cu, 100-lb drums, 3.00c, fob Niagara Falls, N. Y.

odium Cyanide: 96-98%, ½-oz ball, in 200 lb rums, 1 to 900 lb, 16.00c; 1000 to 19,900 lb, 5.00c, fob Niagara Falls, N. Y.

opper Carbonate: 54-56% metallic Cu; 50 lb ags, up to 250 lb, 26.25c; over 250 lb, 25.25c, ob Cleveland.

ickel Anodes: Rolled oval, carbonized, carads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 00 to 500 lb, 61.00c; under 10 lb, 64.00c; ob Cleveland. Add 1 cent for rolled depolarized.

ickel Chloride: 100-lb kegs, 26.50c; 275-lb r 500-lb bbl, 24.50c, fob Cleveland, freight llowed on barrels, or 3 or more kegs.

in Anodes: Bar, 1000 lb and over 119.00c; 00 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; ss than 200 lb, 121.50c; ball, 1000 lb and ver, 121.25c; 500 to 999 lb, 121.75c; 200 to 99 lb, 122.25c; less than 200 lb, 123.75c fob ewaren, N. J.

odium Stannate: 25 lb cans only, less than 00 lb, to consumers 71.8c; 100 or 300 lb rums only, 100 to 500 lb, 63.6c; 600 to 1900 b, 61.2c; 2000 to 9900 lb, 59.4c. Prices fob ewaren, N. J.

inc Cyanide: 100-lb drums 39.25c, fob Clevand; 39.00c, Detroit; 38.00c, fob Philadelphia.

tannous Sulphate: Less than 2000 lb, in 100 b kegs, 100.00c, in 400 lb bbl, 99.00c; more han 2000 lb, in 100 lb kegs, 99.00c, in 400 b bbl, 98.00c, f.o.b. Carteret, Wis.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb fob shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.125	21.125	20.375
Yellow brass	18.875	18.625	18.125
Commercial Bronze			
95%	20.250	20.000	19.500
90%	20.125	19.875	19.375
Red brass			
85%	20.000	19.750	19.250
80%	19.875	19.625	19.125
Best Quality (71-79%)	19.750	19.500	19.000
Muntz Metal	18.250	18.000	17.500
Nickel, silver, 10%	20.250	20.000	10.000
Phos. bronze, A	22.625	22.375	21.375
Naval brass	18.750	18.500	18.000
Manganese bronze	18.750	18.500	17.875

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 19.50c, No. 2 copper 18.50, light copper 17.50, composition red brass 16.75, auto radiators 14.25, heavy yellow brass 12.75, brass pipe, 13.25.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 20.50, No. 2 copper 19.50, light copper 18.50, refinery brass (60% copper), per dry copper content 18.00-19.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 18.50-19.00, No. 2 17.50-18.00, light copper 16.50-17.00, No. 1 composition red brass 14.50-15.00, No. 1 composition turnings 14.00-14.50, mixed brass turnings 8.75-9.00, new brass clippings 15.75-16.25, No. 1 brass rod turnings 12.75-13.25, light brass 8.75-9.25, heavy yellow brass 11.00-11.25, new brass rod ends 13.25-13.75, auto radiators, unsweated 12.75-13.00, cocks and faucets 12.25-12.50, brass pipe 12.75-13.25.

Lead: Heavy 18.50-19.00, battery plates 13.00-13.25, linotype and stereotype 19.50-20.00, electrotype 18.50-19.00, mixed babbitt 19.50-20.00, solder joints, 23.00-24.00.

Zinc: Old zinc 10.00-10.50, new die cast scrap 9.00-9.25, old die cast scrap 6.75-7.25.

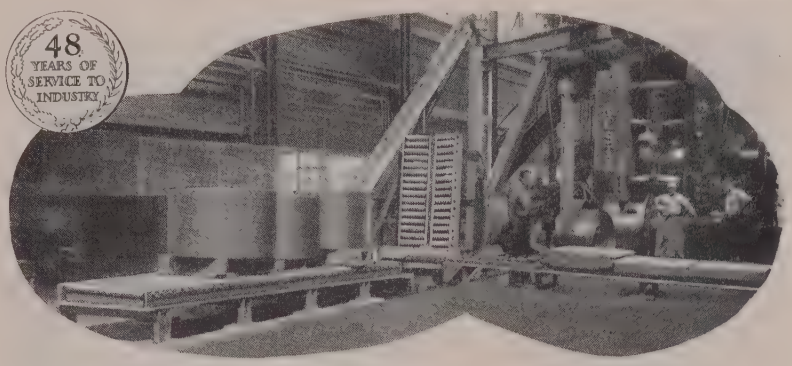
Tin: No. 1 pewter 65.00-67.00, block tin pipe 83.00-84.00, No. 1 babbitt 51.00-54.00, siphon tops 50.00-52.00.

Aluminum: Clippings 2S 16.50-17.00, old sheets 13.00-13.50, crankcase 13.00-13.50, borings and turnings 6.50-7.00, pistons, free of struts, 13.00-13.50.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Nov. Avg.	23.50	21.325	16.580	103.00	17.00	38.50	40.00	73.655
Dec. 31	23.50	21.30–21.35	17.50	103.00	17.00	38.50	40.00	70.00
Dec. Avg.	23.50	21.325	17.50	103.00	17.00	38.50	40.00	70.00

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, fob Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.



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METAL PRODUCTS CLEANING EQUIPMENT

Sheets, Strip . . .

Sheet Prices, Page 368

Television industry becoming increasingly important factor in sheet steel market

Chicago — The television industry, which, according to a prominent spokesman, will be numbered among the country's top ten and will be doing a $5 billion business inside of five years, is cited by steel industry representatives as becoming a more important consumer of flat-rolled products.

Two grades in particular are slated for greater usage by video set manufacturers. These are stainless and electrical, increased demand for the latter already being felt from this direction. It is reported that stainless will be used in substantial quantity in cathode ray tubes, now a major chokepoint to greater set production, with each tube requiring about nine pounds of the material. Another new customer for stainless in this area is expected early in the year when a tableware manufacturer switches its requirements to that material from other metals.

Lessening home appliance demand, extending into refrigerators, washing machines, hot water heaters and stoves, is being reflected in lower output projections this year. Parts and components suppliers to home appliance industry are particularly aware of the cutbacks, a number of companies reporting a lower volume of jobbing contracts. Probably not yet assuming proportions of a trend this business withdrawal represents some manufacturers' plans to perform as many operations as possible inside their own plants. With raw materials pipelines as far short of being filled as they are at present, however, steel men without exception expect a considerable gap between supply and demand to persist. In certain lines, for example, present indications are that the abnormally high steel demand will continue through this year and well beyond. Automakers, as a group, seem to be looking forward to another five-million unit year, despite the decided softness of the used car market presently.

Reflection of the easing in jobbers' business in the area is found in the general reduction among sheet metal fabricators here of the length of the work-week from 48 to 40 hours, several members of the industry having closed their shops completely during the Christmas-New Year's day week. This lower level of operations is reportedly making somewhat larger tonnage of sheets available to other users.

Cleveland — Necessity for consumer quotas on flat-rolled carbon steel all through 1949 is foreseen by one producer. However, the company's salesmen are on the alert for any signs of downturn. Although some appliance manufacturers have reduced production, there has been no overall cutback in their demand for finished steel at mill prices. First to feel any lessening in demand will be premium-priced steels.

Galvanized sheets, one of the tightest products in demand-supply relationship, may become even more stringent if voluntary allocations program for production of grain bins is instituted.

Silicon sheets may become increasingly easier to obtain this year, but increasing customer preference for silicon coil stock is expected to keep demand for that product at a high level.

Cincinnati — Sheet mills closed the year with heavy carryovers, so that much of the tonnage in January will be shipped against 1948 commitments. An increase on extras, in heavy gage hot-rolled, is considered an adjustment and not a forerunner of other imminent changes. The holiday season had little effect in modifying pressure for sheets.

Philadelphia—While some producers of light durable goods are pressing less actively for sheets, overall demand is strong and indications are that there will be no balancing between supply and demand for some months. Most producers look for a stringent supply over at least first half of 1949.

Los Angeles—Producers have closed their books for the first quarter on virtually all rolled and drawn products. Although a cautious attitude among steel consumers is apparent as 1949 gets underway, demand for sheet and strip is as strong as at any time last year and is expected to remain so for months to come.

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HALLDEN
Typical Hallden Automatic Flattening and Cutting Machine

ubular Goods . . .

Tubular Goods Prices, Page 369

Pittsburgh — Pressure for early ipment of mechanical and pressure arbon tubing shows no signs of abat- g, with production still falling sub- cantially below demand and distri- ution continuing on an allocated asis. Deliveries on alloys and stain- ss tubing are available within 4 to 5 eeks with demand fairly well sus- ained at year-end. Industry is con- idering upward adjustment in alloy ubing prices which are based on al- oy bar extra card.

Chicago — Withdrawal of one east- rn mill and only intermittent ship- nents by another into this area has ightened the supply of boiler tubes ere. Mechanical and stainless tubing upply, however, is good.

St. Louis — Pipe demand in this istrict remains on the upgrade de- pite seasonal declines in home and ommercial construction. Plumbing upply houses and hot water heating anufacturers, particularly, are striv- ng to start building inventories but re unable even to keep abreast of lay-to-day needs. Pipemakers are ooked solidly well into 1949 and ould be sold out eight months ahead f they accepted all proffered orders. On the few orders being accepted ow, deliveries are not being prom- sed before June or July. Pressure ontinues to be greatest for small ipe, with builders in the South, un- ampered by severe weather, offset- ing the seasonally declining pipe eeds elsewhere. Consumers con- inue to complain that pipe scarcities ave them on the verge of bank- uptcy, but no actual cases of firms uitting business have been reported. They are, however, undeniably in a squeeze. Export demand in this area also is picking up, notably from Mexico and Latin-America. Percent- age of pipe tonnage exported is small, however, and is not expected to in- crease. Manufacturers doubt Con- gress will take action to increase ex- port licenses.

Los Angeles — Consolidated West- ern Steel Corp. is beginning fabrica- tion at its Maywood plant of large- diameter welded steel pipe for a new transcontinental gas line. Extending from Texas to New York City, the 1840-mile pipeline system will be constructed by Transcontinental Gas Pipeline Corp. Requirements of fab- ricators who are faced with schedules for several large and countless small pipeline projects are strongly main- taining pipeline demand. With avail- ability of their 1949 budgets, buyers for the petroleum companies are back in the market on a large scale for equipment replacement and expan- sion needs.

Seattle — Cast iron pipe inquiry is lagging due to seasonal conditions. Several small projects are pending, but until delivery is speeded cast iron will meet with strong competi- tion from other types.

U. S. Mercury Output Lags

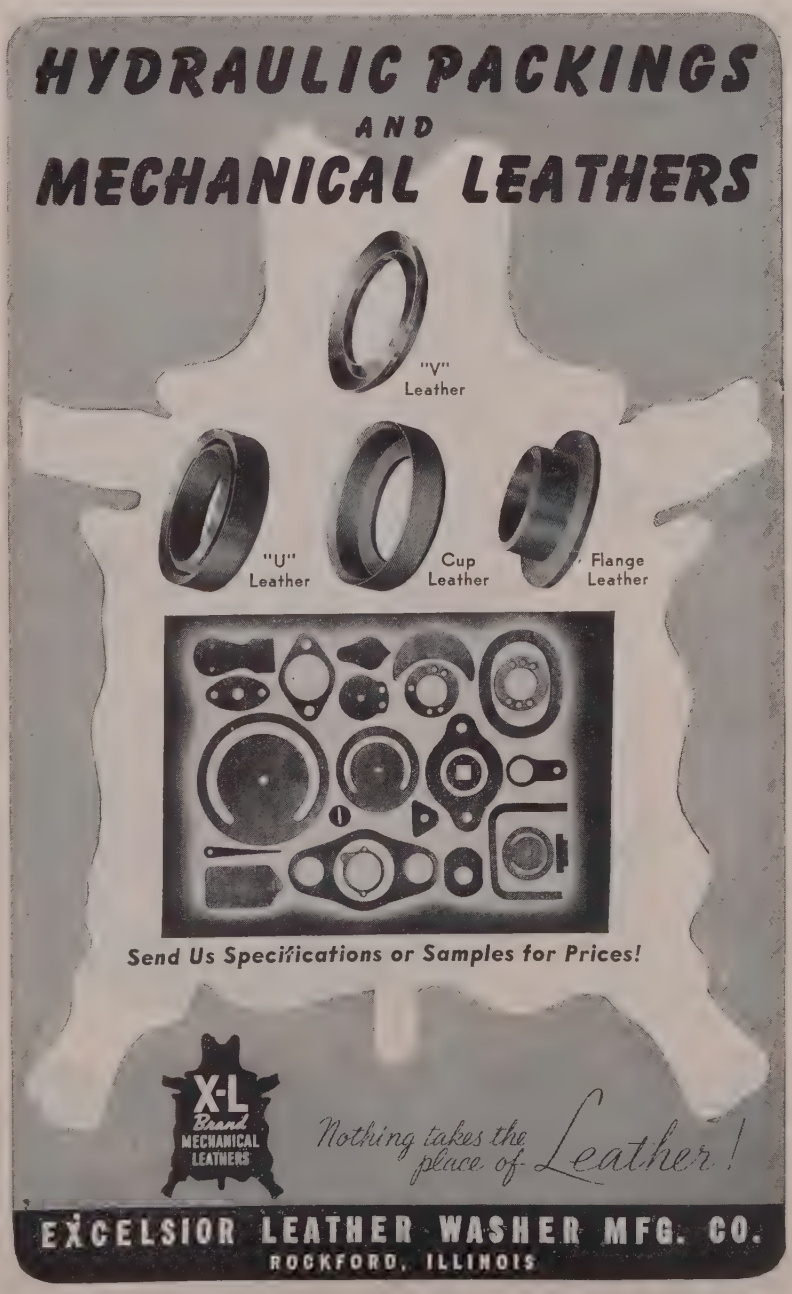
San Francisco — Quicksilver min- ing men in California, who produce most of the U. S. domestic supply of mercury, doubt if operation of the California mines will be stimulated as a result of the Spanish-Italian mercury cartel in raising prices.

California miners cite several rea- sons for this belief. They are uncer- tain of the stability of the new price. They also say the high cost of re- opening many mines, plus the high cost of labor, are major obstacles.

The European cartel has raised its price $14 per flask (76 pounds) to $92 a flask delivered in New York. This level, California men point out, is about what it was in 1937, and they say they can operate today at a price not lower than $100 a flask, and most mines need at least $125 a flask.

Moreover, most of them agree with one mercury mine official who pointed out that "the cartel can put the price down again any time it pleases."

Only two California mines now are operating and U. S. mercury production now is the lowest point in nearly 100 years. At the same time, consumption, at about 50,000 flasks annually, is the highest in peacetime history. Today, U. S. production is running at the rate of about 5000 flasks a year, compared with 54,000 flasks annually during the war years when demand was at an all-time high.



Plates . . .

Plate Prices, Page 369

With the slight holiday lull past, producers expect heavy demand to continue for some time

Philadelphia — Plate producers anticipate strong demand throughout the current quarter and for some time beyond. Following a slight lull as a result of holiday influences, a rebound is now under way. Except for one or two producers, who have been highly conservative in their acceptance of new orders for some time past, most of them have entered the new year with substantial arrearages. Some were forced to blank out January entirely.

Chicago—The shortage of plates has prompted economies never dreamed of in normal times. Saving odd-sized pieces which usually would be relegated to the scrap heap is indicative of this, the cost involved in segregating and stocking these small pieces being definitely secondary to their potential value later on. With warehouses powerless to aid manufacturers when emergency needs for plates arise, either for production or maintenance purposes, these small inventories in many cases have spelled the difference between stoppages and continued production. One complaint commonly registered by plate consumers is their ability to place orders for plate in fabricated form while not being able to get the unfabricated product.

New York—Most plate makers are now into March on their non-certified quotas, although at least two large producers have not as yet set up allotments beyond February. In a few instances, January was blanked out completely, due to arrearages to be carried over at the end of the year. Indications point to almost as heavy, if not heavier, production in the first quarter than in the period just ended, with a result that plate shipments should be well sustained, even though non-certified consumers stand to receive less new tonnage than in the fourth quarter. They stand to receive less, it is pointed out, for the reason that the voluntary allocation programs will likely absorb more.

Los Angeles — Reduction in this year's plate quotas by one major producer is tightening still further an already stringent supply situation. Consumers thirsting for plates see no relief in sight as fabrication activity and demand continue at peak levels. As they have for months past, plate tonnages are bringing premium prices in irregular markets.

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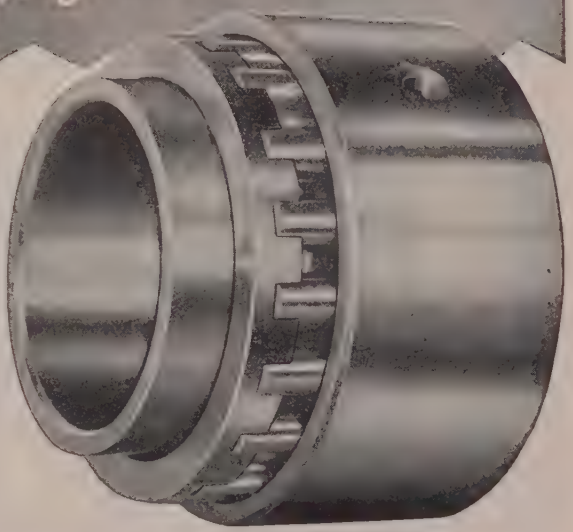

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Structural Shapes . . .

Structural Shape Prices, Page 369

New York — District fabricators look for an early upturn in structural demand now that the holidays are over. For the past two weeks there has been a decided lull, little outstanding being placed and relatively little tonnage involved in bids closed. However, several sizable projects are due for figuring this month and fabricators look for a moderate but steady rise in activity throughout the remainder of the quarter. Backlogs are still heavy, with one leading interest booked ahead about eight months. Bookings generally now average five to six months, although most fabricators can work in a little tonnage in less if it fits in well with the type of work being processed.

Philadelphia—Award of 1040 tons for the state bascule approach span work, Cape May, N. J., featured an otherwise quiet structural market last week. However, some sizable jobs are pending for action over the next few weeks.

Pittsburgh — Most structural fabricators continue to bid new work on basis of specified delivery time after receipt of necessary steel. Tight supply situation in both shapes and plates probably will continue through early months next year, although some fabricators have been able to make slight headway against order backlogs in recent weeks.

Metals Products Division of Koppers Co. Inc., Pittsburgh, recently received a contract for 26 gates, each weighing 35 tons and sheathed in stainless steel, for the Conemaugh river dam in Western Pennsylvania.

Seattle—Fabricating plants report a seasonal lull, but there is considerable potential business. The supply situation continues serious and prevents bidding on larger projects. First quarter allocations offer no relief.

Wire . . .

Wire Prices, Page 369

Boston — Soft spots in wire demand are of an uneven nature, developing where least expected in some cases. Overall demand is strong, however, and for many finished products is well in excess of supply. Pressure has eased for electrical appliances and in affiliated building lines, including hardware involving spring action. Heading wire requirements are heavy, but supply has improved on some additional larger sizes. Low carbon items are in short supply for many needs; production of low carbon is out of line with high carbon goods, primarily due to unfavorable price ratio. Automotive volume holds at high levels.

Pittsburgh — Upward price adjustment on galvanized nails and wire was still under consideration by leading producers at year-end. First quarter demand pattern for wire products shows little variation from preceding periods. However, in some instances, such as upholstery spring wire, consumers' inventories have recorded improvement and this matter is drawing more attention of purchasing agents. Sellers entered the new year with about 2 to 3 weeks carryover tonnage.

Chicago — A year-end look at the wire supply situation reveals inventories of poultry netting with many distributors sufficiently large to last until spring; bale tie supply is also fairly comfortable. Fencing and barbed wire, however, continue acutely short, stocks being virtually nonexistent and exceeded in scarcity only by nails.

Buffalo — Production at Colorado Fuel & Iron Corp.'s Wickwire Spencer Steel Division plant in Tonawanda has been stepped up with the installation of five new drawing units and an overhead hoisting type crane with five individual 1000-pound hoists to serve the new machines.

A.S. & W. Expands at Duluth

STEEL capacity at American Steel & Wire Co. Duluth Works will be increased 243,000 tons a year, or 35 per cent, in a replacement, improvement and rebuilding program. Two open hearths, partially dismantled and taken out of service in the 1930s, will be replaced. A new row of soaking pits will be installed, 57 coke ovens will be replaced, rolling capacity will be increased from 580,000 to 784,000 tons, and new annealing and auxiliary equipment will be installed.

Rails, Cars . . .

New York — Featuring eastern car buying is the award of 5350 by the New York Central system. Orders were distributed among several builders, with deliveries scheduled for second and third quarters.

Local Board of Transportation has awarded contracts for the replacing of 14,400 worn wheels on subway and trolley cars, involving expenditure of more than $910,000. About 12,000 new wheels will be required for the subway lines, with the cost ranging from $56 to $66 each. Trolley lines will take 2400 new wheels, costing from $32.75 to $33.50 each. Another replacement item is steel tires for trolleys, costing $38.50 each. Contracts were placed with Carnegie-Illinois Steel Corp. ($154,476); Bethlehem Steel Co. ($162,135); Baldwin Locomotive Works ($160,203); Armco Steel Corp. ($175,448); Edgewater Steel Co. ($192,543); and National Malleable and Steel Castings Co. ($83,341).

Lima, O. — Lima-Hamilton Corp. has announced the sale of 16 units of the company's new 1000-horsepower diesel-electric locomotives for heavy-duty switching service. Nickel Plate has purchased four while the Erie and the New York Central have each purchased six.

John E. Dixon, president of Lima-Hamilton Corp., said the new locomotive marks the entrance of his company into the diesel switcher locomotive field. The locomotives will be built at the Lima, O., Division.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 368

Seattle — Holiday shutdowns at rolling mills in this area were held to the minimum in view of the sizable backlogs and the continued pressure for reinforcing bars and other construction items. It is estimated that 75 or 80 per cent of the demand stems from public works projects.

SEAVER CROSS-VENT CHECKER BRICKS
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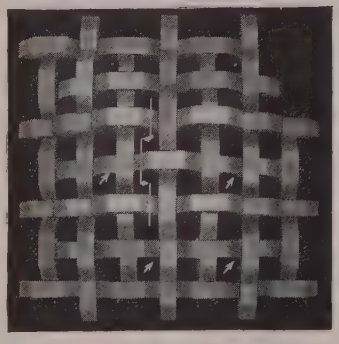

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The results from installations made have proved the great advantage of these new features secured by the Seaver Improved Basket Weave.

The Seaver Cross-Vent Checker Brick is a simple rectangular brick with the upper corners cut off making a double bevel self-cleaning shed roof, and a hole through the middle which gives additional heating surface and equalized heating and pressure over the entire area, and lancing openings if required. Made in stable shapes with the center of gravity below the middle, it is laid up in standard basket weave pattern, but due to a unique and simple cut-away section, each brick is securely locked top and bottom with other brick and cannot move in any direction.

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Pig Iron . . .

Pig Iron Prices, Page 370

Demand for iron continues strong. Supply expected to be larger in 1949.

New York — While buying of foreign iron has declined due particularly to the higher prices, demand for domestic material is well sustained. Even though foundries are experiencing a reduction in casting demand, most of them continue to press for iron. Domestic iron is still much cheaper than cast scrap and, further, melters are anxious to increase the iron in their mixture to a normal ratio as soon as possible.

Principal grades of cast scrap are definitely easier and further price reductions, more substantial than up to now, appear likely, but a return to the normal price relationship between domestic iron and cast scrap still appears to be some time away. Hence, domestic pig iron will probably continue in strong demand for some months to come, barring a severe economic slump, which doesn't now appear likely. Meanwhile, prices on foreign iron are easier, but still well above the domestic level.

Domestic production of pig iron and ferroalloys is expected to have reached a new peacetime high during the year just ended, possibly in excess of 60 million tons, or 2 million tons or so short of the all-time record established during the war. Prospects for production in 1949 are even better. The merchant furnace repair programs are now largely completed, with little likelihood of other major programs developing for at least another two or three years. Non-merchant facilities also are in better shape than at any time in recent years, although, of course, there will always be a certain amount of re-lining and other repair work going on. No new furnaces are believed to be under contemplation at this time, except for the Kaiser unit at Fontana, Calif.

The situation in coke is decidedly better. Improved grades of coal are available and more and better coal treating facilities are now in operation, all of which means a higher quality of coke. Whereas a year or so ago it was estimated that inferior coke was resulting in a loss of anywhere from 10 to 12 per cent in the production of pig iron, it is now the opinion of leading trade interests that the present loss is no more than 5 to 6 per cent.

Earlier estimates of a total importation of 150,000 tons of pig iron last year appear fairly close, although on the conservative side. During the first nine months of 1948, 104,249 gross tons of iron came into this country. Tentative estimates for October place importations around 39,000 tons, thus bringing the total for the first ten months up to more than 143,000 tons.

Importations in November are estimated to have been off substantially and arrivals in December are believed to have been of only modest volume. However, it appears definite that arrivals last year exceeded 150,000 tons. More likely they exceeded 160 000 tons, in the opinion of some trade leaders.

Exports, on the other hand, were relatively negligible. During the first nine months, approximately 4500 tons went to Canada, which cancels out the tonnage that country shipped to the United States.

Exportations of iron to all other countries during the period amounted to about 350 tons.

Based on figures for the first nine months, the Netherlands was the largest shipper to this country with 33,900 tons; Australia was second, with 18,500 tons; and Norway third, with 17,300 tons.

Germany exported to the United States 15,200 tons; Belgium 7300 tons; France 5300 tons; Canada, as previously indicated, 4500 tons; Sweden 1100 tons; and India 1000 tons.

Scrap importations in 1948 are estimated at more than 600,000 tons, with 100,000 tons now on the seas for one leading consumer alone.

Philadelphia—While various foundries reduced their melt over the holidays, most of them continued to take in all the iron scheduled for shipment. They are less interested in the purchase of foreign iron, which is holding at a substantial premium over the domestic market, but are nevertheless pressing for local iron. Even though their melt is off somewhat due to a decline in demand for castings, they are still interested in tonnage to increase the iron ratio in their mix.

Pittsburgh — Most foundries took

a extended holiday over Christmas nd New Year's. Many jobbing undries face a pessimistic produc- on outlook at start of 1949, and here is no tangible evidence this sit- ation will improve. Order backlogs mong gray iron and malleable foun- ries have been most depleted in re- nt weeks, with many concerns forced o reduce working force in establish- ng 3 to 4-day per week operating chedules. However, merchant iron roducers report inability to meet equirements of overall foundry rade, reflecting continued active de- and from foundries producing cast- ngs for steel mill, railroad and heavy nachinery equipment and mainte- ance.

St. Louis—Ratio of basic to found- y iron production, formerly divided 0-50, has shifted to 55 per cent basic nd 45 per cent foundry. Stack op- rators attribute the new ratio to epairs to Missouri-Illinois Furnaces' furnace, but most consumers be- eve the peak in consumption by oundries has been reached and assed. There have been numerous oundry cutbacks—not all of them easonal—and nearly all are feeling he pinch of declining demand for astings. Were cast scrap prices not above those of pig, there is little doubt foundry iron demand would be dropping noticeably. Foundries have been having considerable trouble, however, with rejects where cast scrap is used heavily in the melt to offset iron shortages. This factor is believed storing up local pig iron pressure substantially. Another is the nuisance factor in buying import- ed iron. While tonnage figures are not available, a number of melters a while back went into the foreign mar- ket when a furnace relining job cut Mo-Ill's deliveries in half. Most of these, annoyed by the red tape and escrow requirements of foreign sell- ers, now plan to cease purchasing when their funds posted in New York run out. Meanwhile shipments of iron into this district from Texas stacks also are dwindling. Mo-Ill remains at capacity production of a trifle over 1000 tons daily. Alloca- tions to customers are on a monthly basis and January order books are filled. Books for February will not be opened until later than usual in January, probably around Jan. 25.

Cleveland — Although foundries in this area have experienced decline in recent weeks and are operating three or four days a week, the demand for pig iron continues to exceed supply. Foundrymen have been increasing the proportion of pig iron in their melts as much as possible and cut- ting down on high-priced scrap. This, along with good weather that has facilitated the collection of scrap, has brought about a slight decrease in the price of foundry grades of scrap.

Attempting to analyze the decline in orders for castings, jobbing foun- dries believe it stems from a slowing down of demand for appliances, lack of steel to accompany castings in fab- rication, and a yearend pause for in- ventory-taking.

Cincinnati—The foundry melt has been unusually light in the last two weeks, partly on seasonal influences. Therefore, the shortage of pig iron is less acute, but nonetheless ever pre- sent. Promises of tonnage for the first quarter are on the same basis as heretofore and it is possible fur- naces will come nearer to fulfilling these quotas.

Steel Plant Offered as 1 Unit

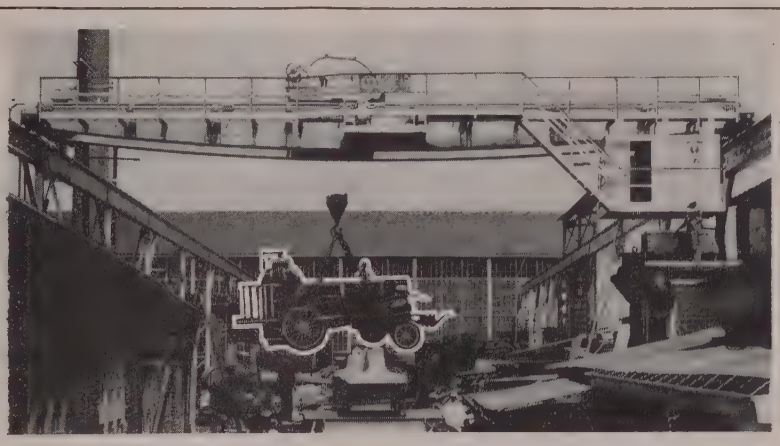
COPPERWELD Steel Co.'s electric furnace steel plant at Warren, O., will be put up for sale as "a single pack- age" Jan. 21 by the War Assets Ad- ministration. This was disclosed by WAA which said it worked out a deal with Copperweld to sell both the pri- vately owned and government owned facilities as a single unit.

It said any purchaser must agree to pay Copperweld $5,400,000 for its share of the facilities, also assume inventory up to $5,500,000.

The government spent $19,000,000 on its share of the plant, which has an ingot capacity of about a half mil- lion tons.

File Steel Prices Advance

Philadelphia — File steel prices have been advanced 50 cents per 100 pounds by the leading eastern pro- ducer. The new prices are 5.35c for the open-hearth grades and 5.90c for the crucible grades. Open-hearth rasp steel also has been increased 50 cents per 100 pounds to 5.05c, mill.



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Scrap . . .

Scrap Prices, Page 372

Most traders expect lower price levels when consumers re-enter market early this year

Pittsburgh—Scrap market was devoid of activity throughout last week of year. Shipments to mills under old contract commitments were fairly well sustained and major consumers' inventories are at comfortable levels. Current scrap quotations have not been tested for past few weeks, with mills practically out of market except for an occasional small lot purchase on a selective basis in respect to quality and freight absorption involved. Some of the larger foundries also have withdrawn from the market, following action initiated by small jobbing foundries earlier last month. Some price weakness has developed in machinery cast with market within a range of $71 to $72. Some trade authorities anticipate slightly lower price levels for nearly all scrap classifications, notably foundry grades, when consumers again enter the market early this year. Much will depend on extent shipment to consumers' plants can be maintained over next few weeks.

New York — Brokers have reduced their buying prices on No. 1 cupola and heavy breakable to $56 f.o.b. shipping point. Other cast grades are unchanged but easy, except for malleable, which continues steady in price but strong in tone. Steel grades are steady, with demand expected to become more active now that the holiday season is over.

Philadelphia — Steel scrap prices continue steady, although weakness still prevails in some of the leading cast grades. Actually at the moment the market on charging box and heavy breakable and No. 1 cupola cast is little more than nominal, pending buying of representative character. Over the past week there was not much buying or selling of any type of scrap.

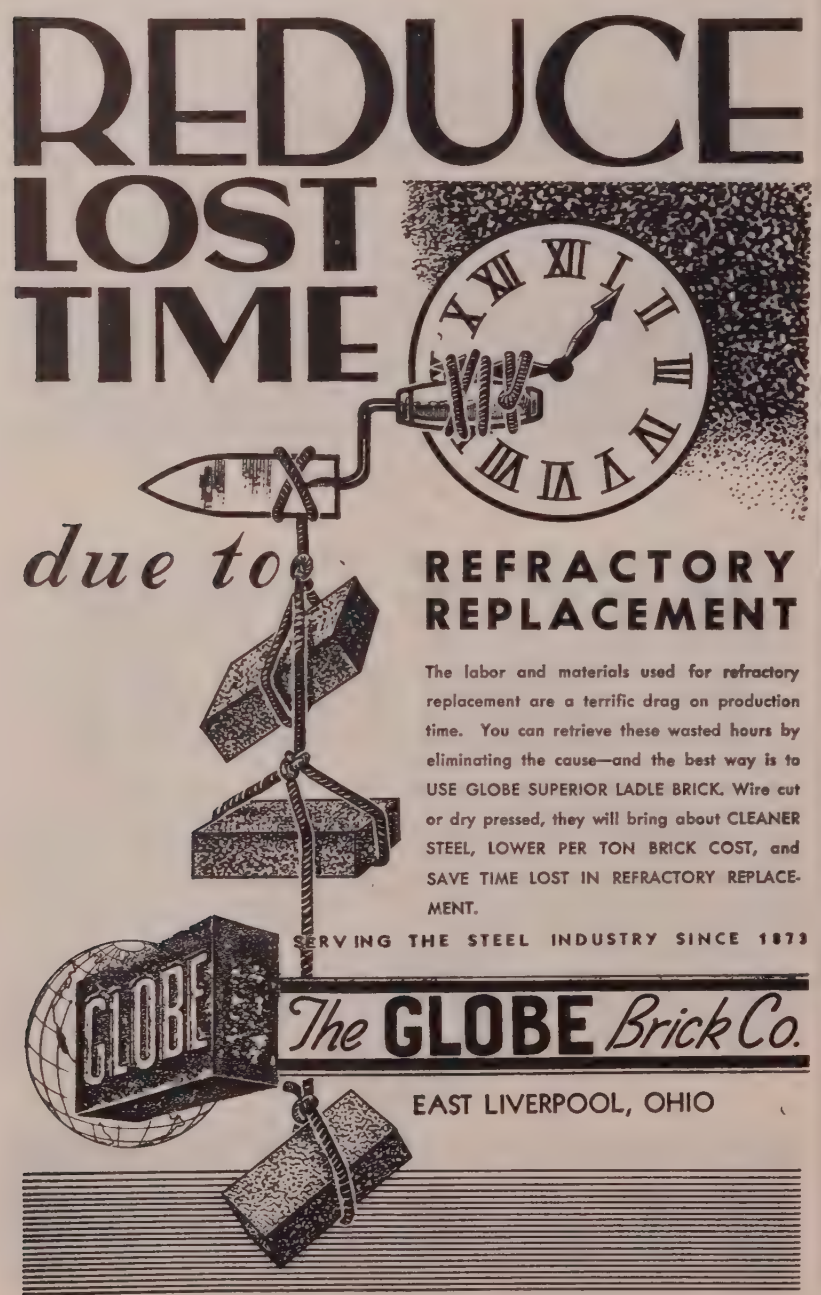
Buffalo — The first business in about two months at formula prices for steelmaking scrap was reported during the holiday week when 8000 tons of No. 2 heavy melting scrap was contracted for at $42.25 per ton. The sale indicated an easier market, but turnings and borings continue to sell slightly above formula. Dealers looked upon the sale of heavy melting as a return to more normal market conditions. Additional sales were expected shortly after the first of the year. Further indications of an easier market were seen in the fact that tie-in sales and conversion deals were difficult to find.

Chicago—Absence of trading, the joint results of seasonal influences and the continued comfortable inventory position of all mills, kept scrap prices nominally unchanged last week with the undertone weak. Weakness was particularly pronounced in railroad scrap and certain dealer grades including cast. Belief was fairly general that the market would continue relatively inactive for some time while inventories are being reduced.

Cincinnati—Dullness in the scrap market, apparent throughout December, was more pronounced during the holiday season. Brokers and dealers were hesitant on predictions in the absence of tonnage buying. The softer undertone, still discernible, was attributed in large part to melters' comfortable inventory position.

Seattle — Due to weather conditions and interrupted water transportation, receipts of steel scrap are below normal and prospects for the coming two months are unfavorable. Mills meanwhile are in poor position although receipts and consumption have been about on a level. The price is firm at $30 gross ton, f.o.b. mill, and no announcement for January has been made. Higher prices have been paid for choice lots in individual sales.

Los Angeles—Collections and mill deliveries are extremely irregular, although improvement is expected with the holidays over. Steelmakers point to poor quality as well as inadequate supplies of scrap, declaring that mills are forced in some cases to do their own processing if production is to be maintained. Dealers, on the other hand, generally maintain that supplies are adequate and blame price factors in those instances where the flow of materials is insufficient. Meanwhile, prices are strong in melting steel, with a continued easy undertone in cast iron grades.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November Pig Iron Output Dips

New York — Pig iron production declined to 5,329,980 tons during November from 5,459,005 tons in October, while production of ferromanganese and spiegeleisen increased to 69,298 tons from 61,389 tons, according to the American Iron & Steel Institute. This made a net decline of 121,116 tons in the combined total to 5,399,278 tons for November.

Combined total production for the first 11 months was 55,253,792 tons compared with 54,030.522 tons for the like 1947 period. Blast furnaces operated at 97.6 per cent of capacity in November compared with 96.6 per cent in October, making the average for the first 11 months 89.5 per cent against 89.8 per cent for the like 1947 period.

Warehouse . . .

New York — Decline in warehouse volume is largely seasonal and is less in carbon products than in alloys and specialties. Further adjustments are being made in stainless prices and restoration of discounts in some form is expected. Small distributors, unable to buy in large volume, are especially at a disadvantage under current minimum quantity levels. Carbon steel products are in short supply with indications volume going to warehouses this quarter will be lower; alloy inventories are generally improved.

Chicago—Demand upon warehouses remains heavy, warehousemen's knowledge of slackening operations in in selected industries being gained only by hearsay. Inventories in some of the largest district warehouses are virtually nonexistent in the flat-rolled carbon products, plates being particularly scarce. Hot-rolled bars also fall into this category, with cold-drawn not too far behind. Stainless, of course, is relatively easy and competition for the available business is fairly strong. In the absence of steel, sales by one leading warehouse for the year lagged behind the previous year's. Volume, however, is an unreliable measure of demand, which has been stronger than it was a year ago, progressive reductions in quotas being held to blame for the tightness.

Cincinnati—Inquiries to warehouses for steel for delivery early in January show the overall demand sustained at the same high level. The year-end shutdowns for holidays and for inventory-taking brought decrease in pressure for tonnage although fabricators would be glad to stock any available.

Places Contract for Furnace

Los Angeles — Fabrication and erection of Kaiser's new blast furnace at the Fontana, Calif., plant has been awarded to Consolidated Western Steel Corp., Maywood. New stack will have a rated daily capacity of 1200 tons, and will be almost identical with the present blast furnace, which was built by Consolidated Steel in 1942. Completion of the new furnace this year will increase Fontana's pig iron capacity to 876,000 net tons annually.

Gets Rolling Mill Contracts

Pittsburgh — Lewis Foundry & Machine Division, Blaw-Knox Co., this city, has received a contract from the South African Iron & Steel Industrial Corp. Ltd. for engineering and construction of a complete rod mill located at Pretoria, Union of South Africa. This installation will consist of a 20-stand mill and auxiliary equipment to roll No. 5 rod.

The company also received a contract from the Argentine government for rolling mill plant equipment to roll aluminum, brass and copper. This order, which covers two mill units and auxiliary equipment, was placed by Direccion General de Fabricaciones Militares. The plant will be located at Buenos Aires.

The two contracts amount to about $2 million.

Denies FTC Steel Case Motion

Washington—Trial Attorney Frank Hier has thrown out most of the steel respondent attorney's motions to strike out, and has decided to leave the great bulk of the government's evidence in the record in the Federal Trade Commission's case against the steel industry.

Steel industry attorneys now have until Jan. 20 to move for limitations in the application of testimony and soon after that the steel respondents will launch their defense hearings.

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Regardless what type hack saw machines and metal-cutting band saw machines you use, MARVEL BLADES will improve performance. There are sound reasons why this is true; practical reasons that are easily understood and demonstrated.
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MARVEL Band Saws are of selected quality. They come ready for use, pre-welded to size for each make and model saw. Individually boxed, they are protected against kinking, rusting or damage to teeth!
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Auto Output Tops 5,500,000

Detroit — Automobile production for the week ended Dec. 25 slumped from 123,315 units the previous week to an estimated 98,069, according to calculations of *Ward's Automotive Reports*. The drop was due to pre-Christmas plant closings, model changeover by Chevrolet, a fire in an assembly building at the Ford Rouge plant, suspensions for inventory and other minor slowing factors usually experienced at the year-end. Last week was expected to see a further slight decline. A total of 85,000 cars and trucks appeared likely, sufficient to push the year's aggregate production for the United States and Canada to something over 5,500,000 units.

Starts Modernizing Foundry

Los Angeles—Work has begun on a $1,100,000 expansion program which is scheduled to make General Metals Corp., Los Angeles, the largest malleable foundry on the Pacific Coast. To be completed in July, the program will involve entire mechanization of the foundry. Two cupolas and a 10-ton holding furnace will enable continuous pouring. Molds will be on roller conveyors, with automatic sand handling and shakeout equipment. Production is expected to be increased to 6000 tons of finished castings annually.

Machinery Order Backlogs Big

Pittsburgh — Industrial machinery builders' order backlogs assure high level of operations through most of 1949; volume of new work is held promising but at somewhat lower level than last year. Steel mill equipment orders for foreign account are expected to be largely made up of small installations of single stand mills, but builders still have large order backlogs for tandem mills and auxiliary equipment ordered by concerns in England, France and South America since termination of the war. However, a new strip mill for Italy is a possibility.

More Television Tubes for Philco

PROGRAM of modernization and mechanization under way at Lansdale Tube Corp., a subsidiary of Philco Corp. at Lansdale, Pa., will enable a substantial reduction in manufacturing costs of cathode ray picture tubes according to the parent company.

By April present facilities will be increased to provide greater cathode ray tube production capacity. The plant some day is expected to become one of the important sources of Philco's supply of television tubes. Philco has scheduled a production of 600,000 television receivers for 1949.

More than $500,000 is being spent on the Lansdale plant, and output is expected to be stepped up so that the facility can fill about 30 per cent of Philco's tube requirements over the next few years.

lational Tube Sets Output Highs

ORAIN, O., works of National Tube o., a U. S. Steel Corp. subsidiary, eached an all-time high in steel in- ot production in November.

The ingot total of 166,250 tons is one f four major new records chalked up t the plant in November, surpass- ng by 2571 tons the October steel ton- age turned out by this plant's 12 pen-hearth furnaces and two besse- ner converters. The other Lorain orks records achieved in November, hich also topped previous highs set ust the month before, are: No. 5 kelp mill, 17,622 tons compared with 7,416; No. 2 butt mill (hot end), 12,- 26 tons compared with 12,235 tons; ll butt mills (hot end), 39,466 tons s against 36,974 tons.

wo-thirds of Farms Electrified

ARM electrification in the United tates has reached 68.6 per cent. On une 30, 4,019,476 farms had been lectrified, an increase of 444,835 over une 30, 1947.

Olds Has Record Backlog

GENERAL MOTORS Corp.'s Oldsmo- ile Division will take five years to atch up with orders on hand, S. E. kinner, vice president and general anager of the division, has stated.

Oldsmobile has 1,114,000 orders for ts 1949 models compared with 400,- 00 orders a year ago, Mr. Skinner aid. In the past six months orders ave been coming in at the rate of 0,000 to 40,000 a day.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1000 tons, 8000-foot section of Soap Lake siphon, steel lined concrete pipe, 22 feet 4 inches diameter; general contract to Utah Construction Co. and Winston Bros. by Bureau of Reclamation.

1800 tons, galvanized steel transmission towers, 24.4-mile North Bonneville-Troutdale line, by Bonneville Power Administration to Bethlehem Pacific Coast Steel Corp., San Francisco, low $445,900.

1500 tons, straight web sheet piling, also 100 tons standard new fabricated T section, for McNary dam, Oregon; bids to district engineer, Walla Walla, Wash., Jan. 14; delivery specified by Aug. 15, 1949.

1040 tons, state bascule approach work, Cape May, N. J., to Bethlehem Steel Co.

100 tons, Holcomb hydro plant, Cornell, Wis., for Northern States Power Co., to American Bridge Co.

378 tons, Hebrew church, 5318 S. Shore Dr., Chicago, to Wendnagel & Co., Chicago.

317 tons, bridge, Sec. 18-F, Brown county, Ill., to Clinton Bridge Co., Clinton, Iowa; for fabrication by Allied Structural Steel Cos., Chicago.

135 tons, Hebrew building, 74th and Chappel Ave., Chicago, to Wendnagel & Co., Chicago.

118 tons, Church of God structure, Moosehart, Ill., to Wendnagel & Co., Chicago.

STRUCTURAL STEEL PENDING

1400 tons, Washington state Agate Pass bridge, option extended to Jan. 31 by Manson Construction & Engineering Co., Seattle, low bidder in September, $1,398,439, to permit financing; projects also include 400 tons reinforcing and 300 tons steel sheet piling.

1350 tons, military barracks in Alaska; general contract to Peter Kiewit Sons Co. and Morrison-Knudson Co., joint low bidders.

405 tons, four-span rolled beam bridge over New Haven railroad, Springfield branch, North Meadows expressway, Hartford, Conn.; bids Jan. 3, state highway commissioner, Hartford.

300 tons, 354-foot Montana state span, Missoula county; general contract to Hansen & Parr Construction Co., Spokane, Wash., subject to Public Roads Administration approval.

280 tons, three-span plate girder bridge over New Haven railroad, Williamantic branch, North Meadows Expressway, Hartford, Conn.; bids Jan. 3, state highway commissioner, Hartford.

145 tons, 126-foot two-span beam bridge, Still river, Winchester, Conn.; bids Jan. 3, state highway commissioner, Hartford.

100 tons, 300-foot Montana state bridge, Yellowstone river; McLaughlin Construction Co., Livingston, awarded general contract, subject to Public Roads Administration approval.

Unstated, Hungry Horse, Montana, power plant; bids to Bureau of Reclamation, Denver, Jan. 11, spec. No. 2504.

Unstated, Army warehouses, Fort Richardson and Whittier, Alaska; bids to Col. W. E. Potter, Alaska district engineer, Seattle. Jan. 18-19.

PLATES . . .

PLATES PLACED

2680 tons, steel linings, Garrison district, Riverside Junction, N. D., for U. S. Engineer, to Commercial Shearing & Stamping Inc., Chicago.

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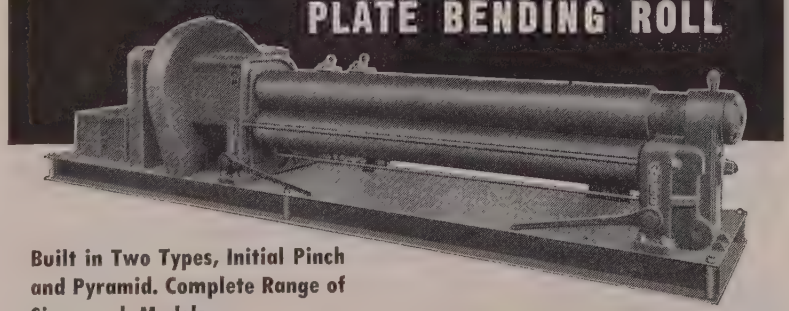
THE WEBB PLATE BENDING ROLL



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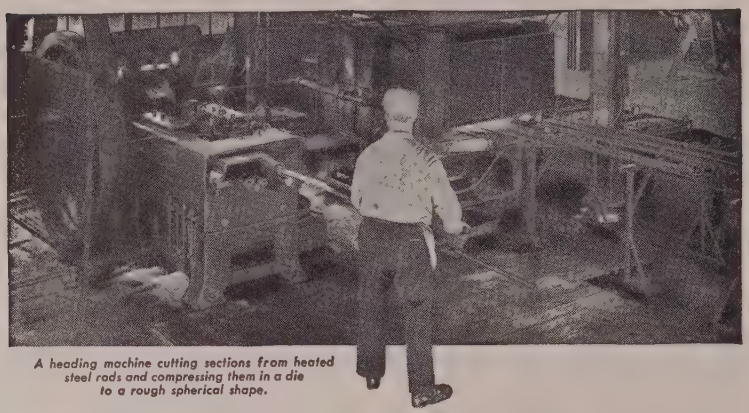

A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape.

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

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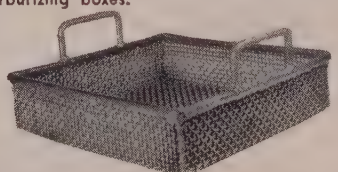

Stanwood Corporation

FABRICATED METAL PRODUCTS

4825 W. Cortland St. Chicago 39, Ill.

REINFORCING BARS . . .

REINFORCING BARS PLACED

12,500 tons, 12,883-foot Soap Lake siphon, reported placed with Oregon Steel Rolling Mills, Inc., Portland, Oreg.; general contract to joint low bidders Utah Construction Co. and Winston Bros., San Francisco.

430 tons, Washington state Deschutes dam project, to Bethlehem Pacific Coast Steel Corp., Seattle; Schuemann & Johnson, Seattle, general contractors, low, $915,950.

REINFORCING BARS PENDING

21,000 tons, outlet work, Ft. Randall dam, S. D., for U. S. Engineer; 6500 tons to McCarthy Improvement Co., Davenport, Iowa, and 6000 tons to Silas Mason Co., New York; 9000 tons expected to be rebid later.

125 tons, substructure Clearwater river bridge, Lewiston, Idaho; J. H. Wise & Sons Inc., Lewiston, low $307,782.

Unstated, auditorium Music building Western Washington college, Bellingham, Wash.; Tucker & Co., Seattle, low base bid $247,945.

Unstated, ramp and approach Steel bridge, Portland, Oreg.; general contract by Oregon Highway Commission to Kuckenberg Construction Co., Portland, $1,277,597.

Unstated, 336-foot Oregon state bridge, Tillamook county; general contract to Lindstrom Bros., Portland, low $102,325.

Unstated, 100-foot Lincoln county state bridge; general contract to Lindstrom Bros., Portland.

Unstated, two-story 120x100 foot store structure for F. W. Woolworth Co., Longview, Wash.; bids to San Francisco offices Jan. 10.

RAILS, CARS . . .

RAILROAD CARS PLACED

New York Central, 5350 cars, distributed as follows: 200 hopper cars to company's own shops; 650 hopper cars to Pressed Steel Car Co., Pittsburgh; 500 hopper cars to American Car & Foundry Co., New York; 500 seventy-ton gondolas and 200 seventy-ton covered hoppers to Pullman-Standard Car Mfg. Co., Chicago; 600 gondolas to Greenville Steel Car Co., Greenville, Pa.; 400 gondolas to Bethlehem Steel Co., Bethlehem, Pa.; and 500 seventy-ton flat cars to General American Transportation Co., Chicago.

CONSTRUCTION AND ENTERPRISE

ALABAMA

BIRMINGHAM, ALA.—Southern Natural Gas Co. has received final authorization to construct pipelines costing $865,000 in Alabama from the Federal Power Commission.

CALIFORNIA

BERKELEY, CALIF.—Colgate-Palmolive Peet Co., 85 Hudson St., Jersey City, N. J., has awarded a $450,000 contract to Cahill Bros., 206 Sansome St., San Francisco, for erection of a building and a spray products plant at Sixth and Carlton Sts.

LOS ANGELES—Alad Aluminum Ladder Corp. has been formed with $100,000 capital by William S. Hambly, Elizabeth Hambly and Don M. Hambly, Pomona, Calif.; Nichols, Cooper & Hickson, 412 First National Bank Bldg., Pomona.

LOS ANGELES—Pittsburgh-Erie Saw Corp., 5250 Avalon Blvd., has awarded a $150,000 contract to Davies, Kensder & Brown, 4915 Exposition Blvd., for construction of a factory; Ellis Wing Tayler, 803 W. Third St., engineer.

KANSAS

KANSAS CITY, KANS.—International Harvester Co., 180 N. Michigan St., Chicago, plans to build an $8 million parts depot and sub assembly plant in the Fairfax district.

KENTUCKY

LOUISVILLE—Reynolds Metals Co. plans a $5 million expansion program at its Lister

Hill, Ala., and Chicago plants which will include the enlarging of its aluminum sheet rolling operations in Alabama.

NEW YORK

BROOKLYN, N. Y.—United Dressed Beef, 219-373 Johnson Ave., has awarded a $1 million contract to Carl Buhr Inc., 1714 Grand Central Terminal Bldg., New York, for a plant addition and alterations.

OHIO

CLEVELAND—Acro Electric Co., 1305 Superior Ave., recently purchased by Willard F. Rockwell Jr., president of Rockwell Mfg. Co., Pittsburgh, and a group from Pittsburgh, will be expanded.

CLEVELAND—Scott & Fetzer, 11401 Locust Ave., is planning a $200,000 addition to its plant.

OREGON

PORTLAND, OREG.—Pacific Power & Light Co. is planning a $1 million central power transmission and distribution center here.

PENNSYLVANIA

PITTSBURGH—Palley Mfg. Co., 1017 Bidwell St., has awarded a $150,000 contract to Branna Construction Corp., Bessemer Bldg., for the erection of a manufacturing building on Bidwell St.; Marks & Simboli, 541 Wood St., architects.

SOUTH CAROLINA

GREENVILLE, S. C.—Maverick Mills, 144 Addison St., East Boston, Mass., is planning to build a $4 million cotton goods mill.

TEXAS

EL PASO, TEX.—El Paso Natural Gas Co. plans construction of facilities costing $52,456,000 for moving and selling natural gas to Pacific Gas & Electric Co.

EL PASO, TEX.—San Juan Pipe Line Co. plans to construct two compressor stations and 572 miles of pipe line costing $28 million.

PORT ARTHUR, TEX.—Gulf Oil Corp. is planning a $19 million expansion program at its refinery.

SAN ANGELO, TEX.—Slick-Urschel Oil Co., San Antonio, has awarded a $6 million contract to Texas Natural Gasoline Corp., San Antonio, for erection of a gasoline plant.

SAN ANGELO, TEX.—Plymouth Oil Co., has awarded a $6 million contract to Hudson Engineering Co., Houston, for a gasoline plant.

WISCONSIN

PORT WASHINGTON, WIS.—Wisconsin Electric Power Co., 231 W. Michigan St., has awarded a $13 million general contract to Hunzinger Construction Co., 4541 N. 124 St., Milwaukee, for the erection of a power plant including equipment.

CANADA

EDMONTON, ALTA.—Imperial Oil Ltd., 50 Church St., Toronto, Ont., has awarded a $2,500,000 contract to W. M. Barnes Co., 727 W. Seventh St., Los Angeles, for enlarging its refinery.

BUCKINGHAM, QUE. — Electric Reduction Co. of Buckingham, R. B. Walker, president, will build a $2 million plant addition.

MONTREAL, QUE.—H. Morgan & Co. Ltd., 585 St. Catherine St. has awarded an $800,000 contract to Sutherland Construction Co., 1440 St. Catherine St. for erection of a factory and warehouse; S. M. Sproule, c/o owner, architect.

PORT ALFRED, QUE.—Aluminum Co. of Canada Ltd., Sun Life Bldg., Montreal, has awarded a $110,000 contract to Foundation Co. of Canada Ltd., 1900 Sherbrooke St. W., Montreal, for reconstruction of its Bauxite plant.

MONTREAL, QUE.—National Breweries Ltd., 990 Notre Dame St. W., has awarded a $3,750,000 contract to A. Robertson, 5035 Western Ave., for construction of a plant.

KRANE KAR Loads and Unloads freight cars, trucks, trailers; Stores materials; expedites Plant Maintenance. Often cuts cost of handling loads to 8c a ton.

No Mobile Crane made today can match **KRANE KAR** speed, safety, and economy of operation... picking up, carrying, and placing loads . . . anywhere, in plant or yard . . . uneven terrain, congested areas, low overhead, up and down ramps.

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KRANE KAR handles loads at Sides as well as at Front.

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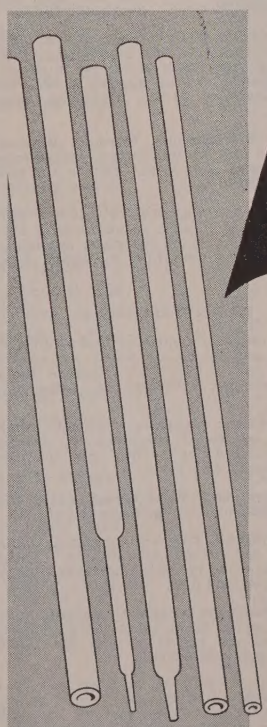

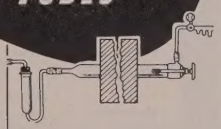

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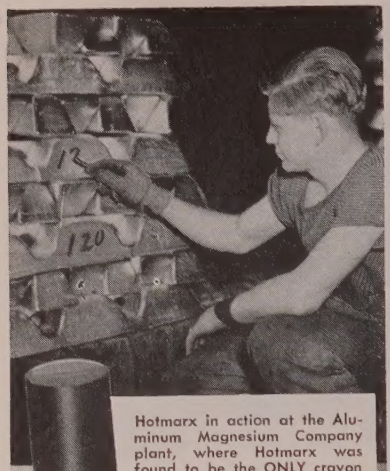

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FERROALLOY PRODUCT PRICES

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $57, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $160 per gross ton of alloy, c.l., packed, $172; gross ton lots, packed, $187; less gross ton lots, packed, $204; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price; $165, Rockwood, Tenn.; $162, f.o.b. Birmingham and Johnstown, Pa., furnaces; $160, Sheridan, Pa.; $163, Aetna, Pa. Shipment from Pacific Coast warehouses by one seller add $31 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $201; less gross ton lots, $218 f.o.b. Chicago. Add or subtract $2 for each 1%, or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lot 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max. 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si; packed 19.90c; ton lots 21.00c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 14.65-15c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.90c per lb of alloy, ton lots packed 10.3c, 200 to 1999 lb 10.65c, smaller lots 11.15c. Delivered. Spot up 0.5c.

BRIQUETTED ALLOYS

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.0c, per lb of briquet, c.l. packed 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c. **(Small size**—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

VANADIUM ALLOYS

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb of contained V_2O_5, freight allowed.. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c, freight allowed.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Carload, packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.25c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 16.50-17.00c per lb of alloy ton lots 17.90-18.00c; less ton lots 19.40-19.50c f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn.; $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.10.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth, Pa., packed in bags containing 20 lb of molybdenum, 80.00c.

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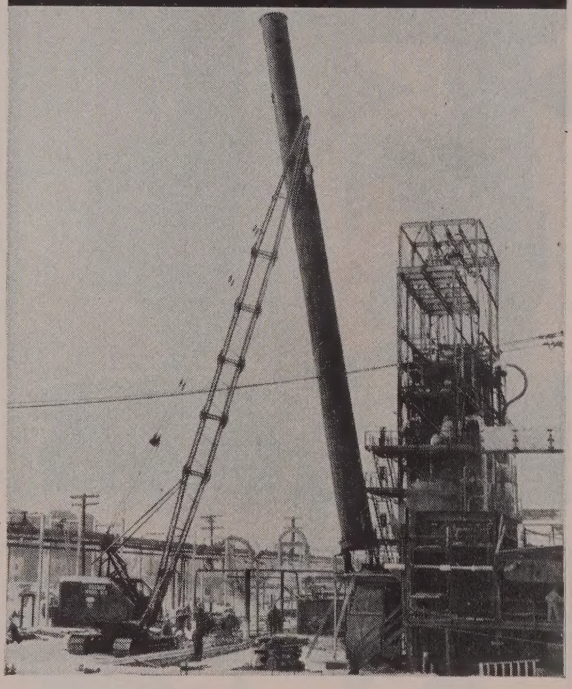

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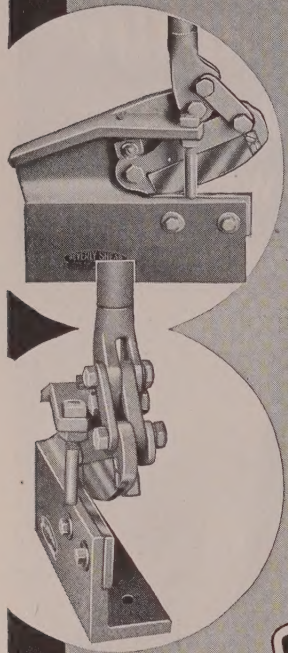

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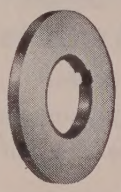

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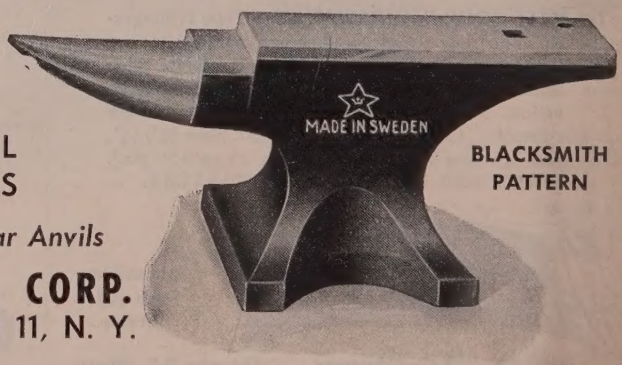

BLACKSMITH PATTERN